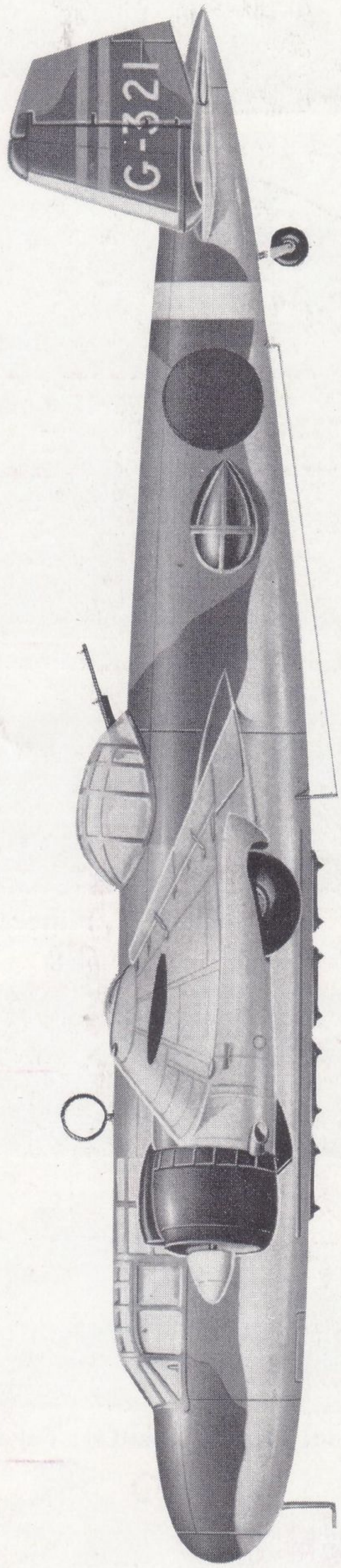
PROFILE PUBLICATIONS

The Mitsubishi G3M "Nell"



NUMBER 160

RETAIL PRICE
UNITED KINGDOM TWO SHILLINGS
UNITED STATES & CANADA 50 CENTS

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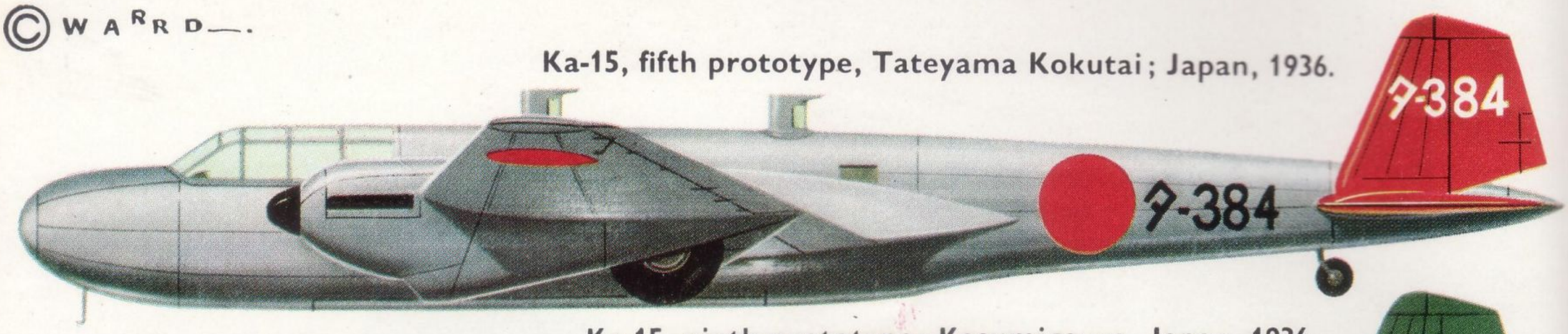
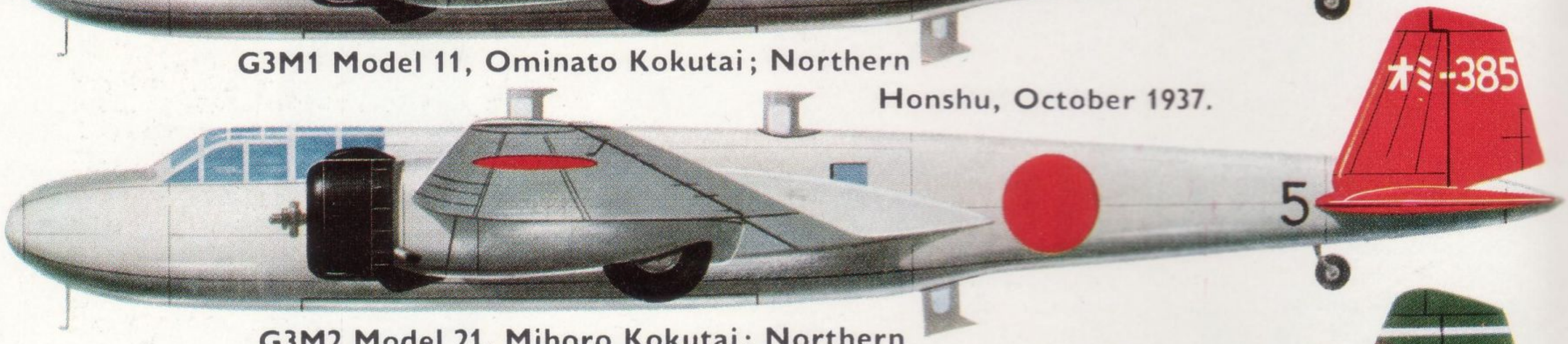
Ka-15, fifth prototype, Tateyama Kokutai; Japan, 1936.



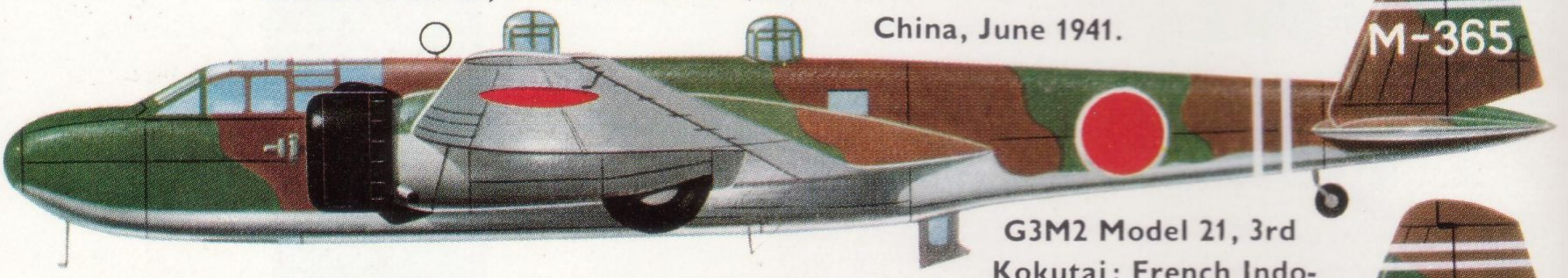
Ka-15, ninth prototype; Kasumigaura, Japan, 1936.

G3M1 Model 11, Kanoya Kokutai; Taipei (Formosa), July 1937.

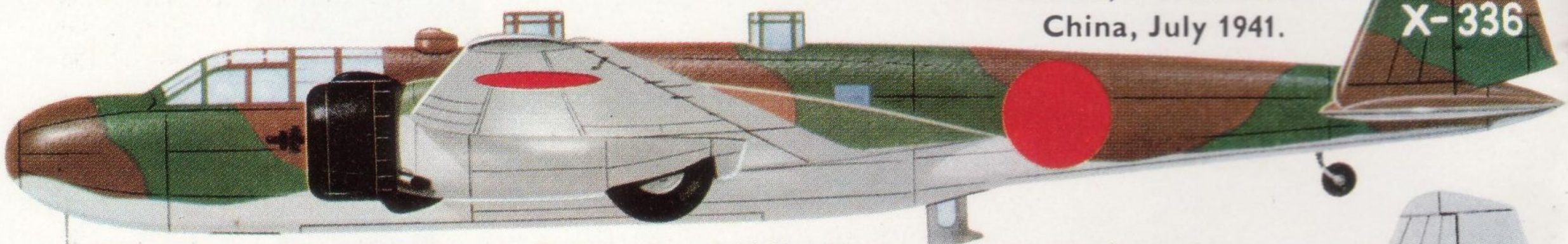
G3M1 Model 11, Ominato Kokutai; Northern Honshu, October 1937.



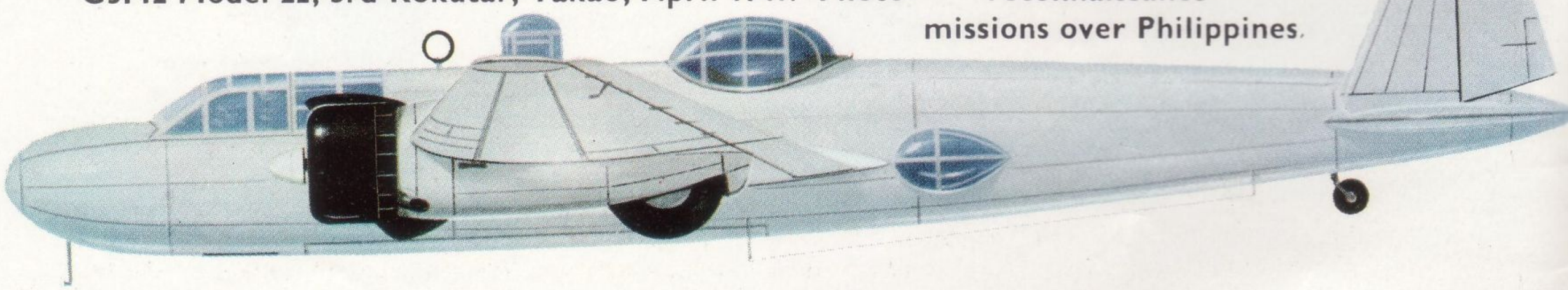
G3M2 Model 21, Mihoro Kokutai; Northern China, June 1941.



G3M2 Model 21, 3rd Kokutai; French Indo-China, July 1941.



G3M2 Model 22, 3rd Kokutai; Takao, April 1941. Photo-reconnaissance missions over Philippines.



The Mitsubishi G3M "Nell"

by Rene J. Francillon, Ph.D.

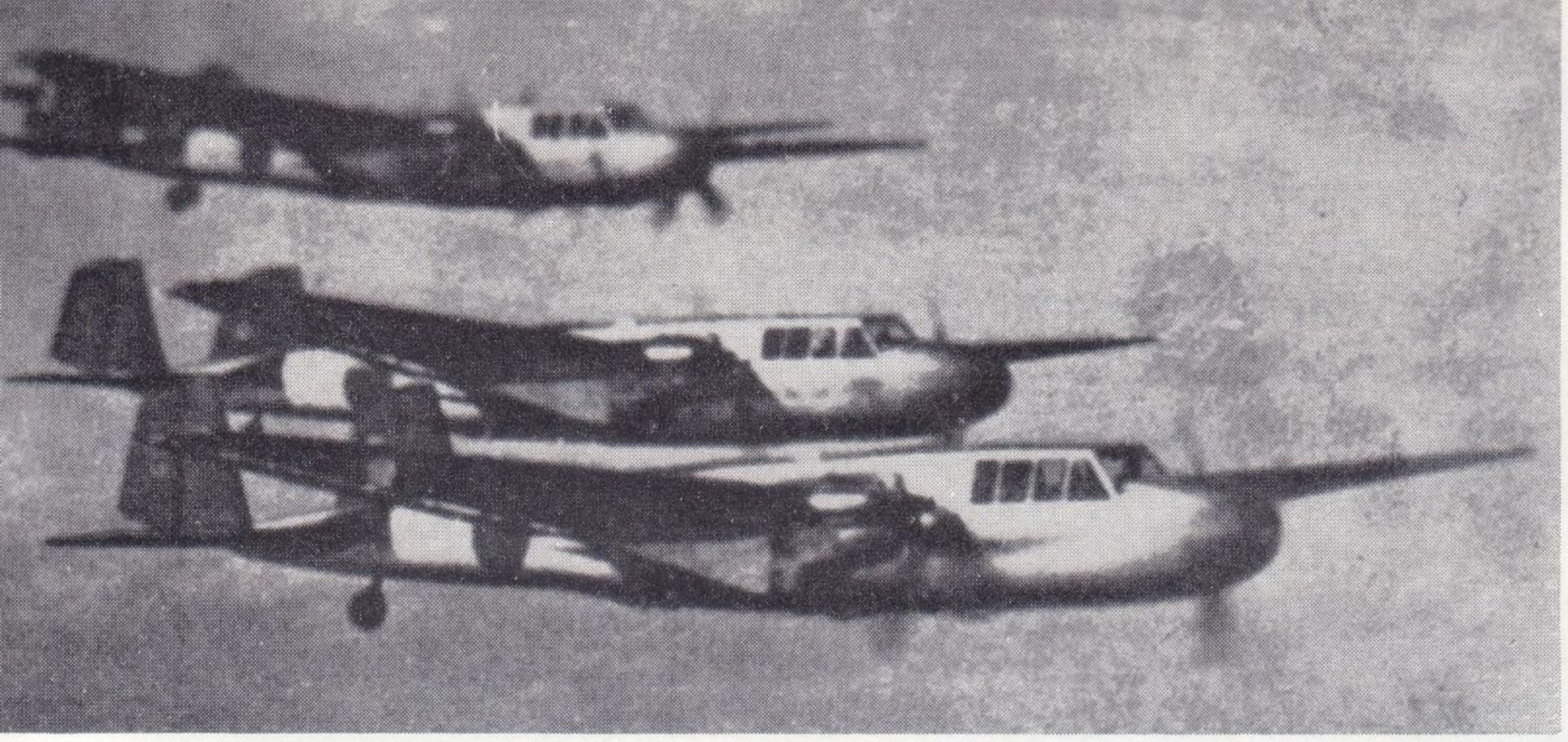
A trio of G3M3's from a training unit. The use of a white border around the Hinomaru *marking on these aircraft indicates that this photograph was taken after 3rd July 1943.* (Photo: Heinz J. Nowarra)

Known to the Allies as "Nell", the twin-finned belle, the Navy Type 96 Attack Bomber was obsolescent when the war broke out but, like its contemporary the Heinkel He 111, it soldiered on until the end of the Second World War. Despite its obsolescence the Mitsubishi G3M took part with considerable success in some of the most brilliant air-sea battles of the war; but it had already earned its place among the most famous aircraft at the time of its appearance when it became the first Japanese bomber aircraft to equal or surpass the performances of the best bomber aircraft then entering service in the air forces of the Western Powers.

The year 1932 is one of the most important in the history of naval aviation in Japan, as during that year the Imperial Japanese Naval Staff made a concerted effort to initiate the development of a complete series of aircraft to re-equip their units with aeroplanes of indigenous design. Aircraft designed under this 7-Shi programme included two types of carrier fighters, three of carrier attack bombers (torpedo bombers), one type of carrier dive bomber, three designs of reconnaissance seaplanes and one type of attack bomber (land based bomber). However, the goals for this programme had been set too high and only two of these types were accepted for production, the Navy Experimental 7-Shi Reconnaissance Seaplane as the Navy Type 94 Reconnaissance Seaplane (Kawanishi E7K, "Alf") and the Navy Experimental 7-Shi Attack Bomber as the Navy Type 95 Attack Bomber (Hiro G2H). Although the 7-Shi programme failed to live up to the expectations of the Naval Staff the seeds had been sown and from then on the Imperial Japanese Navy relied on domestic aircraft manufacturers to equip their aviation units. How this policy succeeded will be illustrated in the following paragraphs by the history of the development of the Navy Type 96 Attack Bomber.

ORIGIN OF THE DESIGN

When the Imperial Japanese Navy had initiated their 7-Shi programme, specifications were issued to the manufacturers on a competitive basis for all the types of aircraft previously listed except for the land-based attack bomber which was developed by the staff of the Naval Aircraft Establishment at the *Dai Juichi Kaigun, Hiro* (11th Naval Arsenal, Hiro). As a signatory of the Washington and London Disarmament Treaties Japan was limited in the number of aircraft carriers that they could build and the Japanese Naval Staff was anxious to supplement their carrier force with a force of long-range land-based bombers. To fill this requirement a team of the Hiro Naval Arsenal with Lieutenant Commander Jun



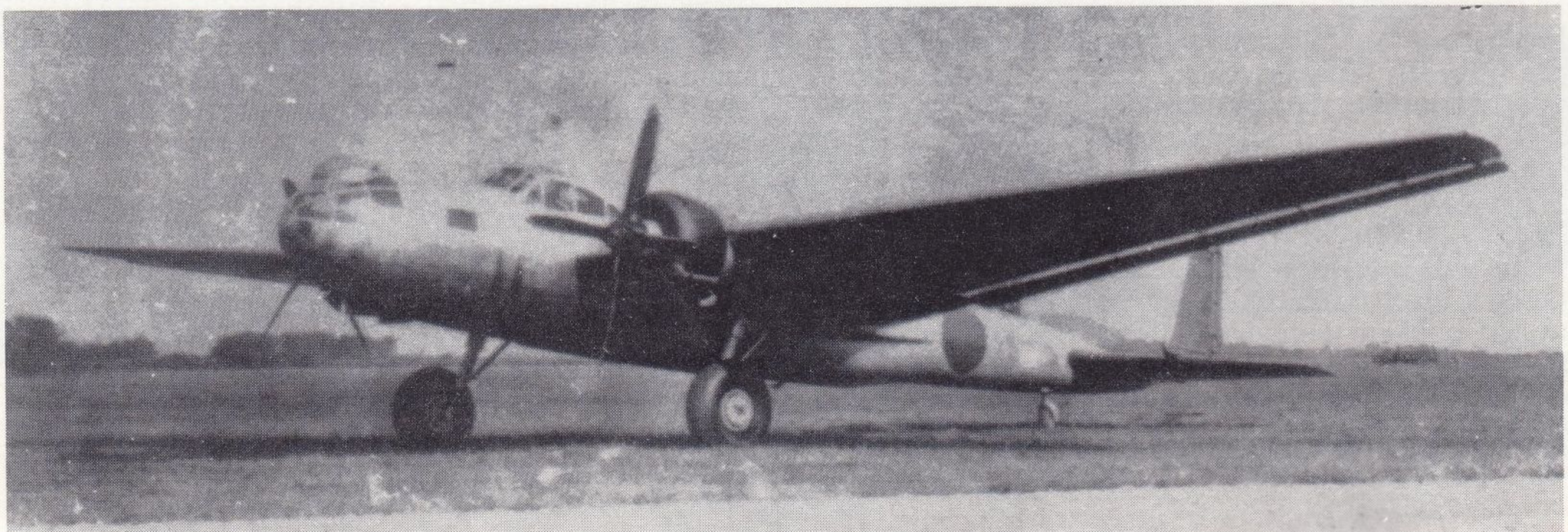
Ka-15 prototypes, the second, fifth and sixth aircraft, powered by 600 h.p. Hiro Type 91 liquid-cooled engines. (Photo: via the author)

Okamura as Chief Engineer and Commander Misao Wada of the Naval Bureau of Aeronautics' Technical Division as special assistant set out in the spring of 1932 to design the Navy Experimental 7-Shi Attack Bomber (Hiro G2H1). Powered by a pair of 900 h.p. Hiro Type 94 liquid cooled engines the aircraft was characterized by the use of the typical Junkers "double wing" design. Flown for the first time from Yokosuka to Kasumigaura Airfield in March 1933, the aircraft soon proved to have a remarkable range of 2,300 miles without bombs and a maximum bomb load of 2,000 kg. (4,410 lb.). However, the Navy did not have sufficient prior experience with this type of aircraft and production, under the designation Navy Type 95 Attack Bomber, was limited to eight aircraft, including the prototype, which served in Japan with the *Yokosuka Kokutai* (Naval Air Corps) and saw limited combat operations in China with the *Kisarazu Kokutai*.

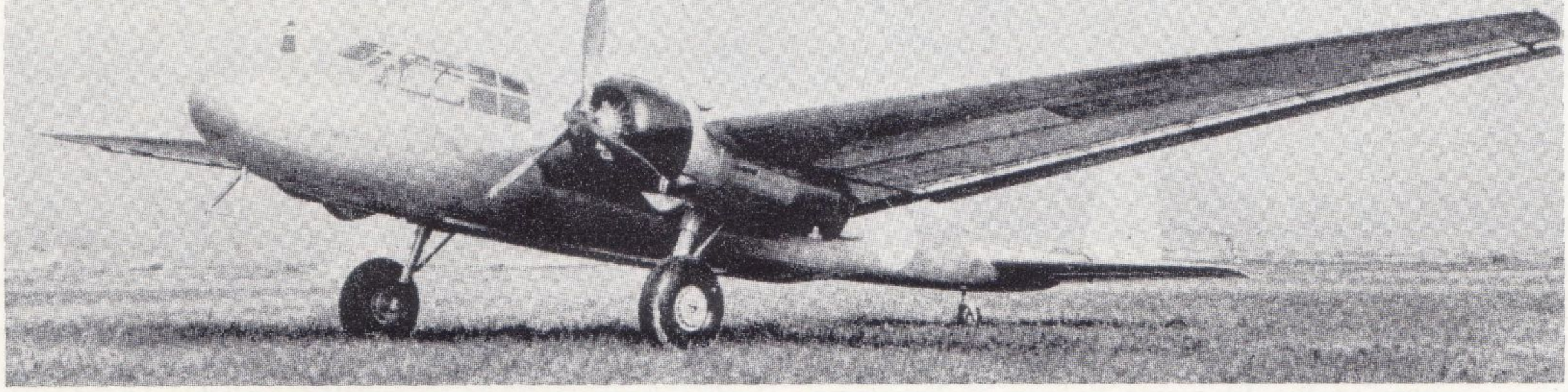
Despite this partial failure the Japanese Navy persisted in its effort to develop an aircraft capable of co-operating with the fleet from land bases within a radius of 1,000 miles. In early 1933, Rear Admiral Isoroku Yamamoto, a strong believer in the importance of aviation in future naval battles who later became famous as the Commander in Chief of the *Rengo Kantai* (Combined Fleet) of the Imperial Japanese Navy, was Chief of the Technical Division of the Naval Bureau of Aeronautics. Adm. Yamamoto was well aware that at the time only the Aircraft Group of *Mitsubishi Jukogyo K.K.* (Mitsubishi Heavy Industries Co., Ltd.) had sufficient experience in the design of land-based long-range aircraft, after building for the Imperial Japanese Army the twin-engined Ki-1 and Ki-2 bombers and the four-engined Ki-20 bomber; and following his recommendations, Mitsubishi received a non-competitive 8-Shi specification for a land-based twin-engined long-range reconnaissance aircraft. From the inception of the project Adm. Yamamoto saw the aircraft as an experimental type to be used for developing long-range operations rather than as a future operational aircraft and, consequently, Mitsubishi was freed from meeting specific military requirements. To design this aircraft, which received the manufacturer's designation Ka-9, Mitsubishi organized a team led by Sueo Honjo, Chief Designer, Tomio Kubo and Nobuhiko Kusabake.

An exceptionally clean airframe with retractable undercarriage combining the best features of the unsuccessful G2H1 with Junkers "double wing" and corrugated skin in the rear sections of the wing was adopted; the aircraft was powered by a pair of 500 h.p. Hiro Type 91 liquid cooled engines. The aircraft took to the air in April 1934 with Yoshitaka Kajima, Mitsubishi's chief test pilot, at the controls and soon proved to be a complete success. With 4,200 litres (924 Imp. gallons) of petrol the Ka-9 had a normal range of 2,737 miles and a maximum range of 3,760 miles whilst its stability and manoeuvrability exceeded those of previous twin-engined naval aircraft. Admiral Yamamoto expressed his personal satisfaction for a job well done and the Imperial Japanese Naval Staff, believing it inadvisable to develop two separate types of aircraft to perform respectively long-range reconnaissance and long-range bombing missions, issued to Mitsubishi a non-competitive 9-Shi specification calling for a long-range land-based bomber to be developed from the Ka-9 and capable of carrying an offensive load of 800 kg. (1,764 lb.) and a defensive armament of three 7·7 mm. machine guns. Although this specification had been issued to Mitsubishi on a non-competitive basis, Nakajima Hikoki K.K., which were the prime suppliers of the J.N.A.F., offered their LB-2, a long-range attack bomber developed as a private venture from the Douglas DC-2 then built under licence by Nakajima. The Imperial Japanese Navy, which had been highly impressed by the performances of the Mitsubishi Ka-9, rejected the LB-2 but, later on, awarded to Nakajima a contract to build under licence the G3M2 and G3M3 versions of the production model of the successful Mitsubishi design.

One of fifteen Mitsubishi Ka-15 prototypes fitted with a bombardier position in a "greenhouse" nose. (Photo: via Jiro Horikoshi)



A Ka-15 powered by a pair of Kinsei 2 engines driving fixed pitch four-blade wooden propellers as seen during flight trials.
(Photo: via the author)



A red-tailed Navy Type 96 Attack Bomber Model 11.
(Photo: via the author)

PROTOTYPES AND SERVICE TRIALS

To comply with the J.N.A.F. requirements the Mitsubishi team, now led by Kiro Honjo, undertook to design a new aircraft, which received the Company's project number Ka-15, whilst retaining as much of the earlier Ka-9 design as was feasible. The wings of the Ka-9 with a span of 25·0 m. (82 ft. $0\frac{1}{4}$ in.) and an area of 75·0 sq. m. (807·3 sq. ft.) were married to a new fuselage of larger diameter providing space for three retractable turrets, each housing one 7·7 mm. machine gun, and for bomb racks under the centre fuselage. The wing's skin was modified by replacing the corrugated metal panels used on the wing trailing edge of the Ka-9 with smooth metal panels. The retractable undercarriage, still an innovation in Japan, was simplified to ease maintenance and reduce drag when extended and the tail surfaces were enlarged to cope with the increased longitudinal movement of the centre of gravity. Due to increases in structural weight and payload the capacity of the petrol tanks had to be reduced from 4,200 litres (924 Imp. gallons) on the Ka-9 to 3,805 litres (837 Imp. gallons) on the Ka-15. The first prototype, powered by two twelve-cylinder Hiro Type 91 liquid cooled engines with a take-off rating of 750 h.p. and a normal rating of 600 h.p., was completed in July 1935 and made its first flight shortly thereafter at Kagamigahara Airfield, Gifu Prefecture, with Mitsubishi's test pilot Yoshitaka Kajima and Lieutenant Sada of the Imperial Japanese Navy at the controls. From its first flight the aircraft demonstrated remarkable flying characteristics and it was soon evident that the J.N.A.F. confidence in Mitsubishi Jukogyo K.K. was fully rewarded: the Navy Experimental 9-Shi Attack Bomber (G3M1) was indeed a high performance aircraft equal to the best products developed in the Occident. In the next twelve months, twenty additional prototypes and pre-production aircraft were built, these differing in the following respects:

c/n 2, 5 and 6: Identical to first prototype. One tested with semi-retractable ski undercarriage for operations from snow covered fields. Two 600 h.p. Hiro Type 91 liquid cooled engines driving fixed pitch four-blade wooden propellers (MW 116).

c/n 3: Identical airframe. Two 680 h.p. 14-cylinder Mitsubishi "Kinsei 2" radial engines driving fixed pitch four-blade wooden propellers (MW 126).

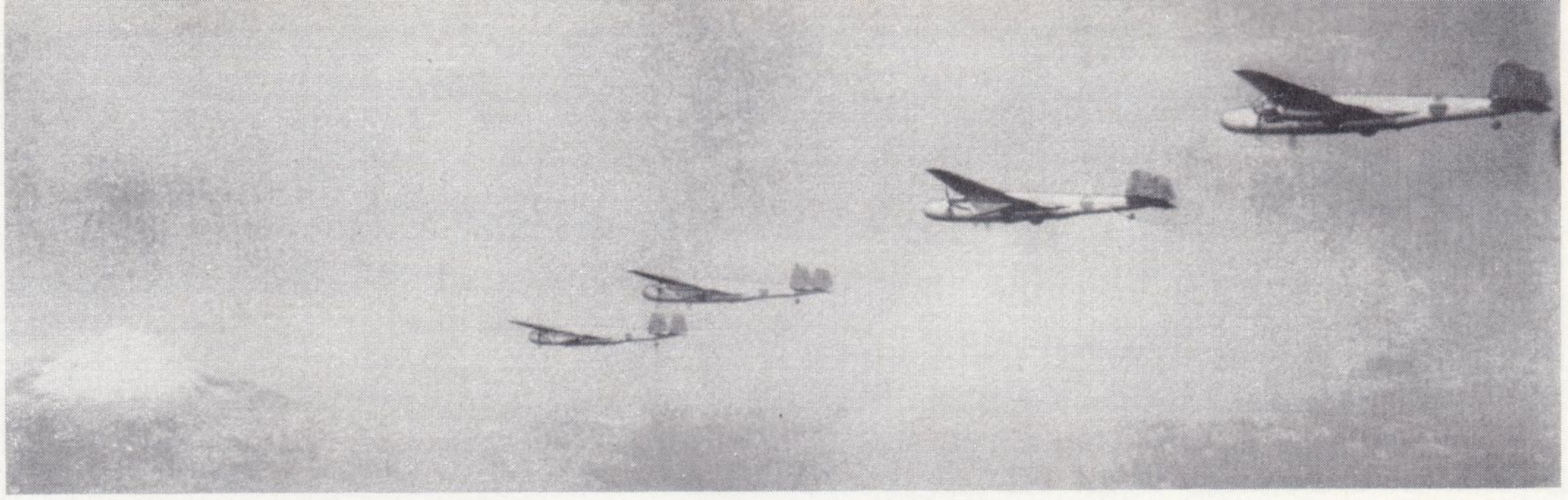
c/n 4: Still identical airframe but powered by a pair of 790 h.p. 14-cylinder Mitsubishi "Kinsei 3" radial engines driving variable pitch three-blade metal propellers (Hamilton Standard CS 16).

c/n 7, 9, 10 and 12 to 21: New fuselage with bombardier/navigator position moved from behind the pilots to a new "greenhouse" nose incorporating an optically flat bombing window and an astrodome. The canopy covering the pilots' cockpit now protruded from the fuselage and provided some degree of rear vision. Two "Kinsei 2" driving MW 126 propellers.

c/n 8: Identical to c/n 7 except for increased wing dihedral.

c/n 11: Airframe identical to that of c/n 7 but two "Kinsei 3" with Hamilton Standard CS 16 propellers.

All these aircraft underwent accelerated flight trials and no major problems were encountered. However, the second prototype, flown by Chief Warrant Officer Chiku and four crew members, crashed near the Korea-Manchuria border. Investigations failed to reveal the exact cause of the crash but defective propellers or aileron flutter were suspected as the probable causes. The propellers already adopted for the production aircraft were the variable pitch three-blade metal Hamilton Standard CS 16 rather than the four-blade wooden MW 116 as used on the crashed aeroplane and, consequently, only the aileron mass balance was increased to solve any possible aileron flutter problem. One aspect of the testing of the



A formation of Mitsubishi Ka-15 aircraft flying towards Mount Fuji. The first three aircraft are powered by Hiro Type 91 liquid-cooled engines and the last machine is powered by Kinsei 2 radials. (Photo: Ikuo Komori)

G3M1 which particularly satisfied the J.N.A.F. was the increase in performances made possible by the "Kinsei" engines. With no noticeable changes in range, the radial engines allowed an increase in climb rate and service ceiling whilst the maximum level speed went from 196 m.p.h. on the first prototype to 207 m.p.h. on the aircraft powered by "Kinsei 2" and to 216 m.p.h. on the "Kinsei 3" powered machines.

Following manufacturers' and J.N.A.F. performance and handling trials, twelve of these aircraft were assigned to the *Tateyama Kokutai* at Tateyama on Sagami Sea, south of Tokyo, for service trials. At that time the versions of the aircraft with solid nose received the unofficial designations G3M1a (Hiro Type 91 powered aircraft) and G3M1b (Kinsei powered aircraft) whilst the version of the aircraft with "greenhouse" nose became known as the G3M1c. During the summer of 1936, before the completion of these tests, the Imperial Japanese Navy instructed Mitsubishi to proceed with the production of a version similar to the fourth prototype with "Kinsei 3" engines, production aircraft being designated Navy Type 96 Attack Bomber Model 1, later Model 11 (G3M1). The aircraft thus became the first Japanese aircraft with retractable undercarriage to be placed in production.

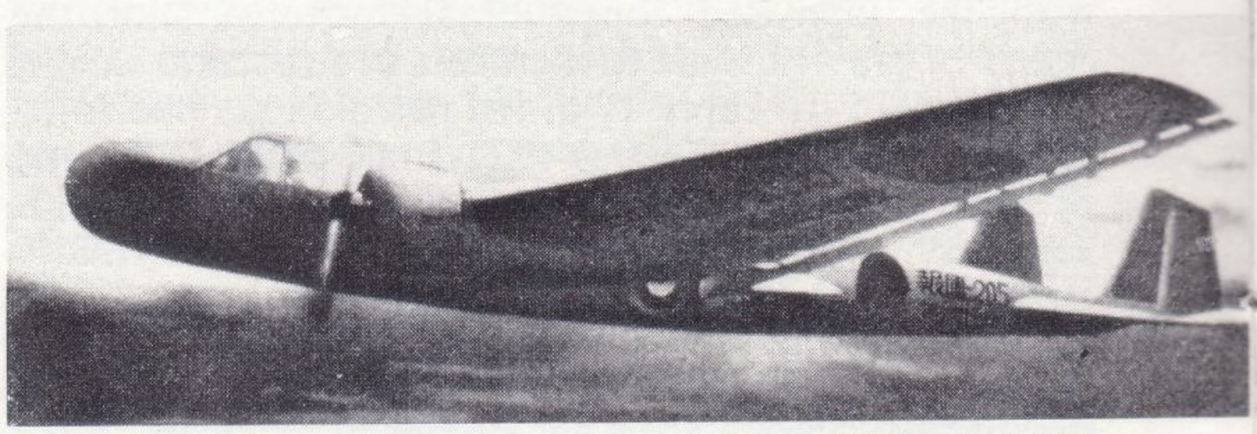
Service trials with the *Tateyama Kokutai* had demonstrated the need to improve the pilots' cockpit and to increase engine power. Accordingly production aircraft were fitted with a new canopy over a redesigned cockpit and only thirty-four "Kinsei 3" powered G3M1 Model 11 (c/n 22 to 55 inclusive) were built. Due to a shortage of variable pitch propellers some of these aircraft were temporarily fitted with fixed pitch four-blade MW 126 propellers.

Of four types of medium bombers entering service at approximately the same time (see Table I), the British Armstrong Whitworth "Whitley I", the American Douglas B-18, the German Heinkel He 111B-1 and the Japanese Mitsubishi G3M1, the last type had the best overall performances, its speed being only bettered by that of the He 111B-1 but its normal range exceeding that of any of its rivals. These remarkable performances were made possible by careful attention to weight savings and by a limited bomb-load resulting in a substantially lower loaded weight. Due to its moderate wing loading and low power loading the G3M1 had the best handling characteristics and it can be said that with this aircraft Japan achieved for the first time parity of equipment with the major air powers.

However, neither Mitsubishi nor the Imperial Japanese Navy intended to rest on their laurels and the G3M1 was soon supplanted on the assembly lines by the more powerful G3M2 or Navy Type 96 Attack Bomber Model 21. On the G3M2 various equipment changes dictated by early operations, including new dorsal turrets of two different designs, were incorporated and fuel tankage was increased by 15 Imp. gallons to 852 Imp. gallons (3,874 litres). Three hundred and forty-three G3M2 Model 21's were built at Mitsubishi's Nagoya plant and were powered by two 1,075 h.p. "Kinsei 41" or "42" radial engines driving variable pitch three-blade metal propellers. Some of these aircraft were later re-engined with a pair of "Kinsei 45" with identical take-off rating but with military power increased from 990 h.p. at 2,800 m. (9,190 ft.) to 1,000 h.p. at 4,200 m. (13,780 ft.).

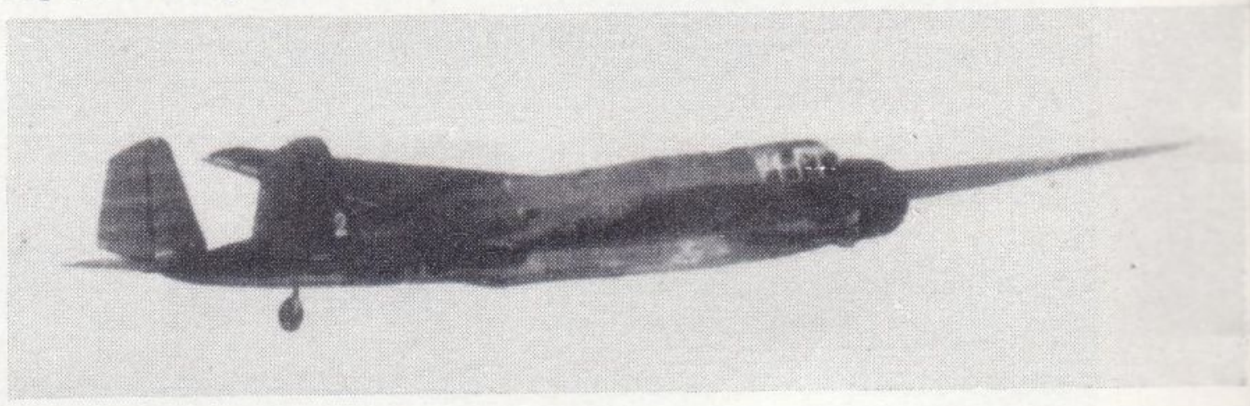
THE WAR IN CHINA AND THE FIRST TRANSOCEANIC RAIDS

When on 7th July 1937 the second Sino-Japanese Incident of the decade began two units of the Imperial Japanese Navy were ready to take part in the operations with 42 Navy Type 96 Attack Bombers: the *Kisarazu Kokutai* (24 aircraft) was poised at Omura, Nagasaki Prefecture, on Kyushu and the *Kanoya Kokutai* (18 aircraft) was stationed at Taipei, Formosa. One week after the beginning of the hostilities the *Kanoya Kokutai* mounted an attack on the Hangchow and Kwangteh areas, covering some 1,250 miles over



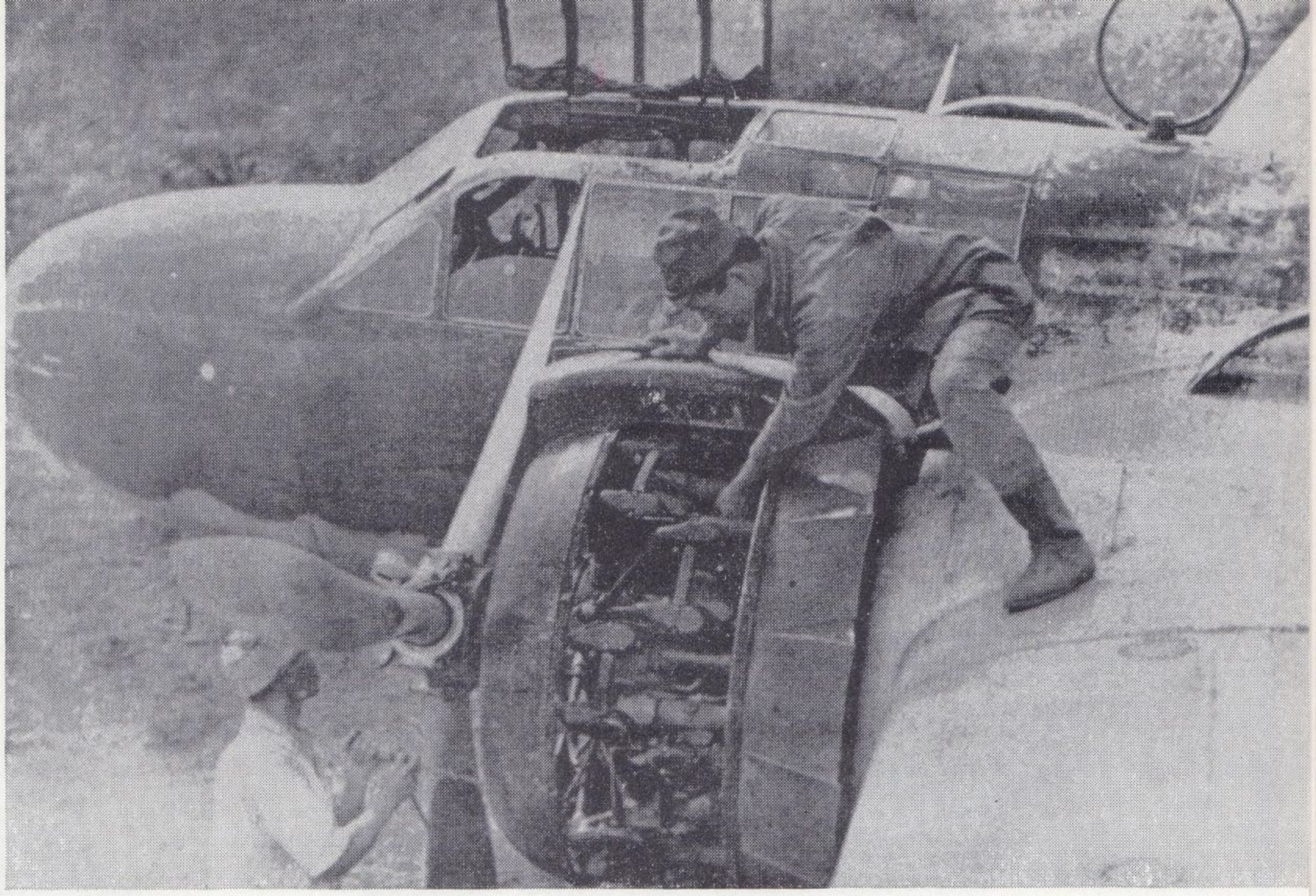
This G3M1 bears the presentation markings "Hokoku-205" on the rear fuselage and under the port wing. (Photo: via the author)

A Navy Type 96 Model 11 photographed during the Sino-Japanese conflict. (Photo: via the author)



water despite poor weather. This feat, the first transoceanic bombing operation in the history of air warfare, was matched the following day when the *Kisarazu Kokutai* mounted from its base on Kyushu an attack on Nanking and Shanghai. Despite the ominous warning of the actual state of readiness of the air arm of the Imperial Japanese Navy implied by these operations, the future Allies soon forgot it and, as will be told later, on 10th December 1941 Admiral Phillips ventured *H.M.S. Prince of Wales* and *H.M.S. Repulse* within 400 nautical miles of Japanese air bases. Few additional transoceanic raids were carried out but soon the G3M2's were moved to bases on the Chinese continent. As the Chinese had removed their fighter units beyond the effective range of the Japanese fighters then available (Navy Type 95 Carrier Fighter—Nakajima A4N1—and Navy Type 96 Carrier Fighter—Mitsubishi A5M2), the G3M2's had to operate without fighter escort. Despite the relatively small size of the motley collection of Chinese fighters, Japanese bomber losses rose alarmingly. Under combat operations the G3M2 proved itself capable of absorbing considerable battle damage as long as the petrol tanks were not hit. However, these tanks were not protected and the aircraft, when hit in the petrol tanks, was prone to catch fire. Furthermore, flying in small formations—seldom more than 18 aircraft—the G3M2 Model 21 had insufficient defensive armament. Despite combat losses, the G3M2 force was slowly increased and in the summer of 1940 the Imperial Japanese Navy had some 130 aircraft of this type in China organized in four units (*Kanoya*, *Takao*; 13th and 15th *Kokutais*) and operations were mounted further and further inland; major targets included Chungking, Chengtu and Lanchow. In September 1940, all G3M2 units except the 13th Kokutai were brought back to Japan and Formosa to be re-organized and re-equipped with the new G3M2 Model 22 with increased defensive armament.

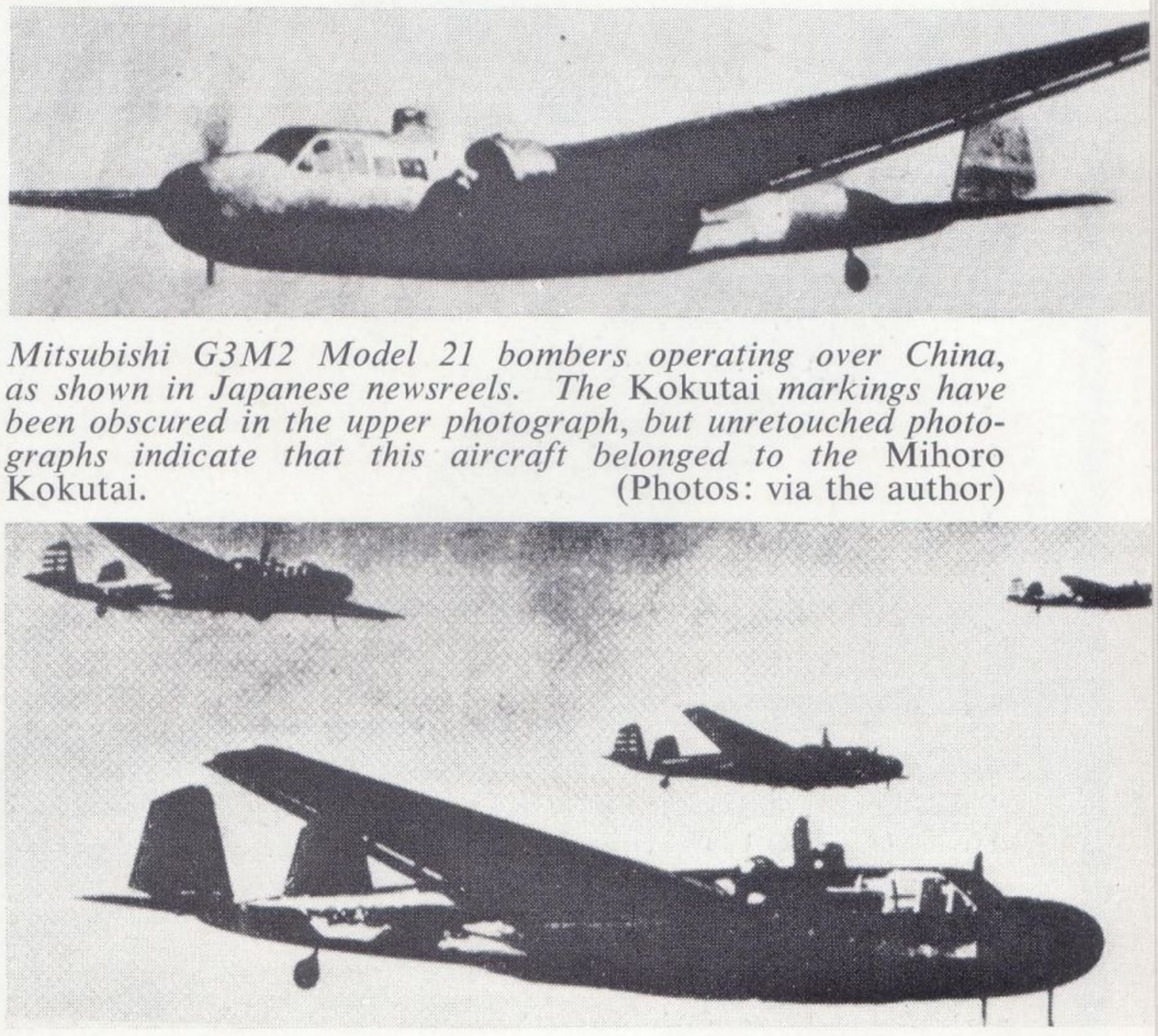
Under combat conditions the lower retractable gun turret proved to be of little value as, when extended in firing position, drag was excessive and thus the aircraft was left with a practical armament consisting of only two upward firing flexible 7·7 mm. Type 92 machine guns in retractable turrets. To remedy this deficiency the manufacturers modified extensively a G3M2 Model 21. The small rear upper turret was replaced by a large "turtle back" turret housing a flexible 20 mm. Type 99 Model 1 cannon which could be elevated 90° and had a lateral field of fire of 15° on both sides. The small upper front turret housing a 7·7 mm. machine gun was retained but the lower turret was dispensed with. The wing trailing edge fillets were considerably reduced in size and blister type turrets, each housing a flexible 7·7 mm. machine gun, were mounted on both sides of the fuselage immediately behind the wings. Later a fourth 7·7 mm. machine gun was added and could be fired from each



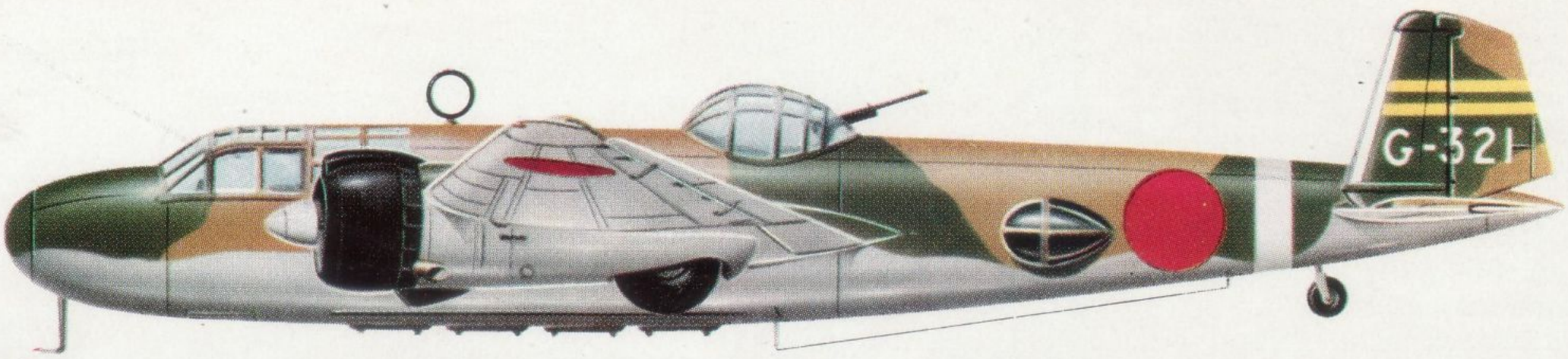
This close-up shows the port Kinsei 45 engine of a G3M2 Model 22. (Photo: S. Tanaka)

side of the cockpit. Despite the increased armament the Navy Type 96 Attack Bomber was left undefended against frontal attack from below. Firing tests conducted with this experimental aircraft were conclusive and this armament was incorporated on the 399th and subsequent aircraft designated Navy Type 96 Attack Bomber Model 22 but still retaining the G3M2 short designation. Production Model 22 aircraft had a smooth fuselage bottom without cut-out as the lower turret had been removed, and the port blister turret was moved rearward to prevent interference between the two side gunners and to increase the total defensive field of fire. Like many of the earlier G3M2's, the Model 22 aircraft were fitted with automatic pilot and radio direction finder built in Japan under a licence of the Sperry Corporation, these two instruments contributing effectively to the safety of operation over water; whilst they were

(*continued on page 10*)



Mitsubishi G3M2 Model 21 bombers operating over China, as shown in Japanese newsreels. The Kokutai *markings have been obscured in the upper photograph, but unretouched photographs indicate that this aircraft belonged to the* Mihoro Kokutai. (Photos: via the author)



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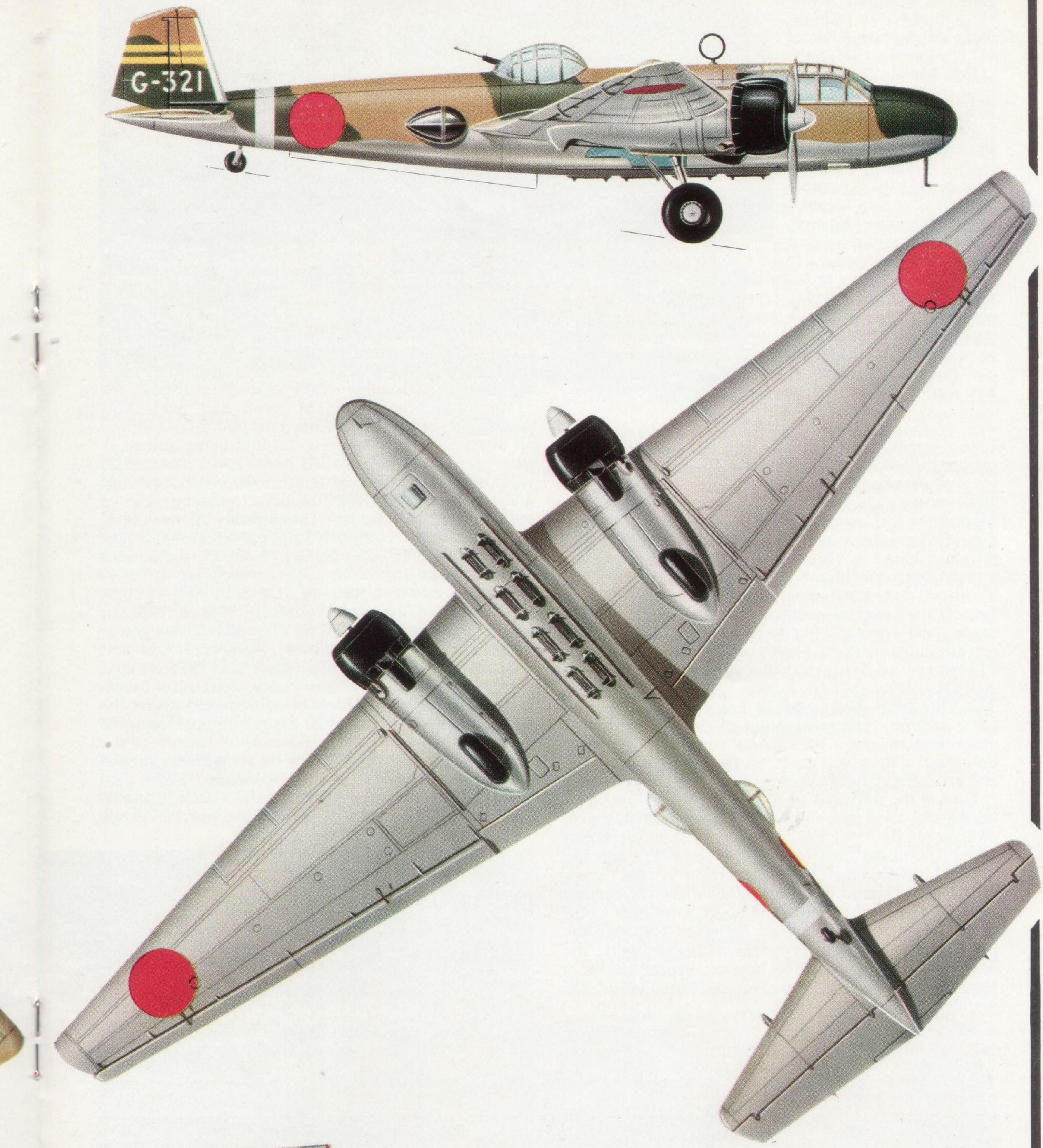
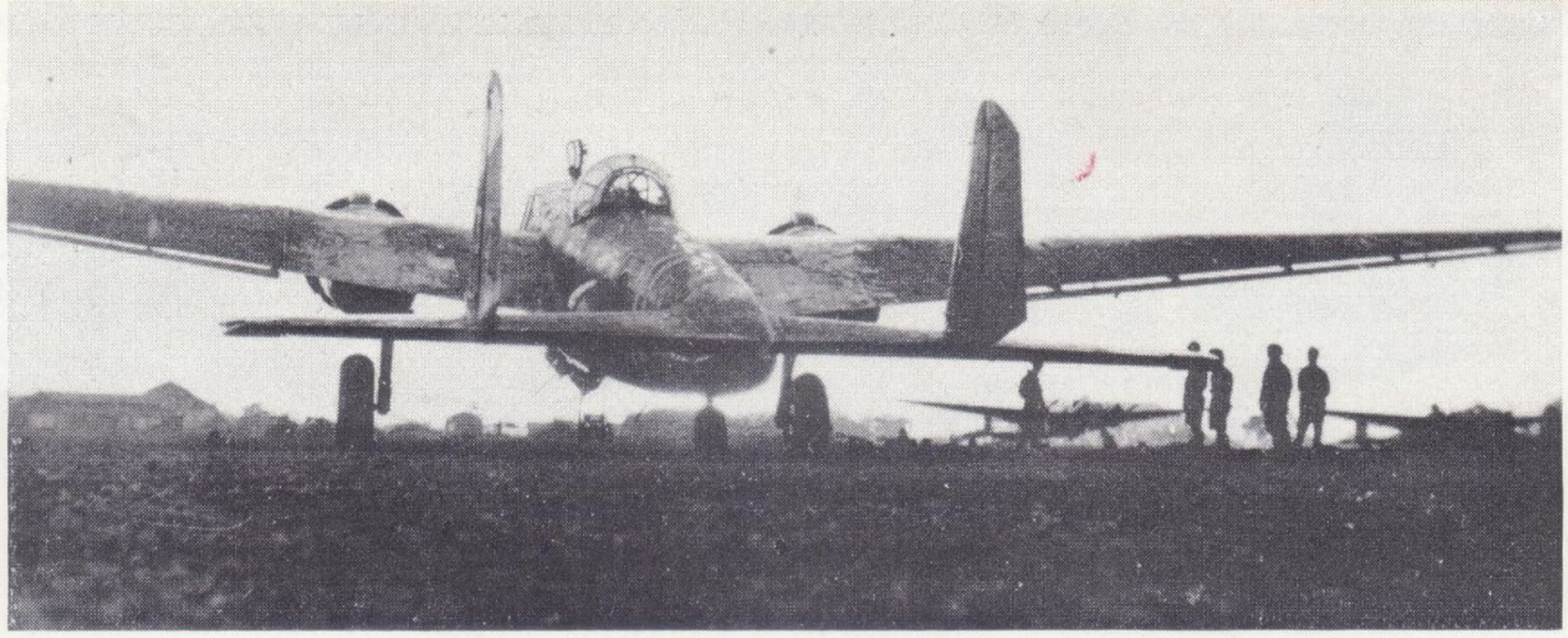


MITSUBISHI G3M2 (Navy Type 96 Attack Bomber Model 22) flown by Lieutenant Sadao Takai, leader of the 2nd *Hikotai* (squadron) of the Genzan *Kokutai* (Genzan Naval Air Corps) during the attack on H.M.S. Repulse and H.M.S. Prince of Wales off the coast of Malaya on 10th December, 1941.

powered by either a pair of "Kinsei 41" or "42" or, more often, two "Kinsei 45". From 1941, the G3M2 Model 22 was also built by Nakajima Hikoki K.K.*

From April 1941, the Imperial Japanese Navy once again reinforced its land-based attack bomber units in China by deploying the *Genzan*, *Kanoya*, *Takao*, 1st and 3rd *Kokutais* equipped with the new G3M2 Model 22 and the still newer Mitsubishi G4M1 (Navy Type 1 Attack Bomber, Betty). Intensive operations were conducted against the Chinese during a five months period but in August 1941 most land-based bombers were moved back to French Indo-China, Formosa and Japan in preparation for the larger scale conflict which now appeared probable.



The distinctive "turtle" dorsal turret housing a flexible 20 mm. Type 99 Mk. 1 cannon which was characteristic of the Model 22 and 23 versions of the Navy Type 96 Attack Bomber.
(Photo: Heinz J. Nowarra)

CIVIL OPERATIONS

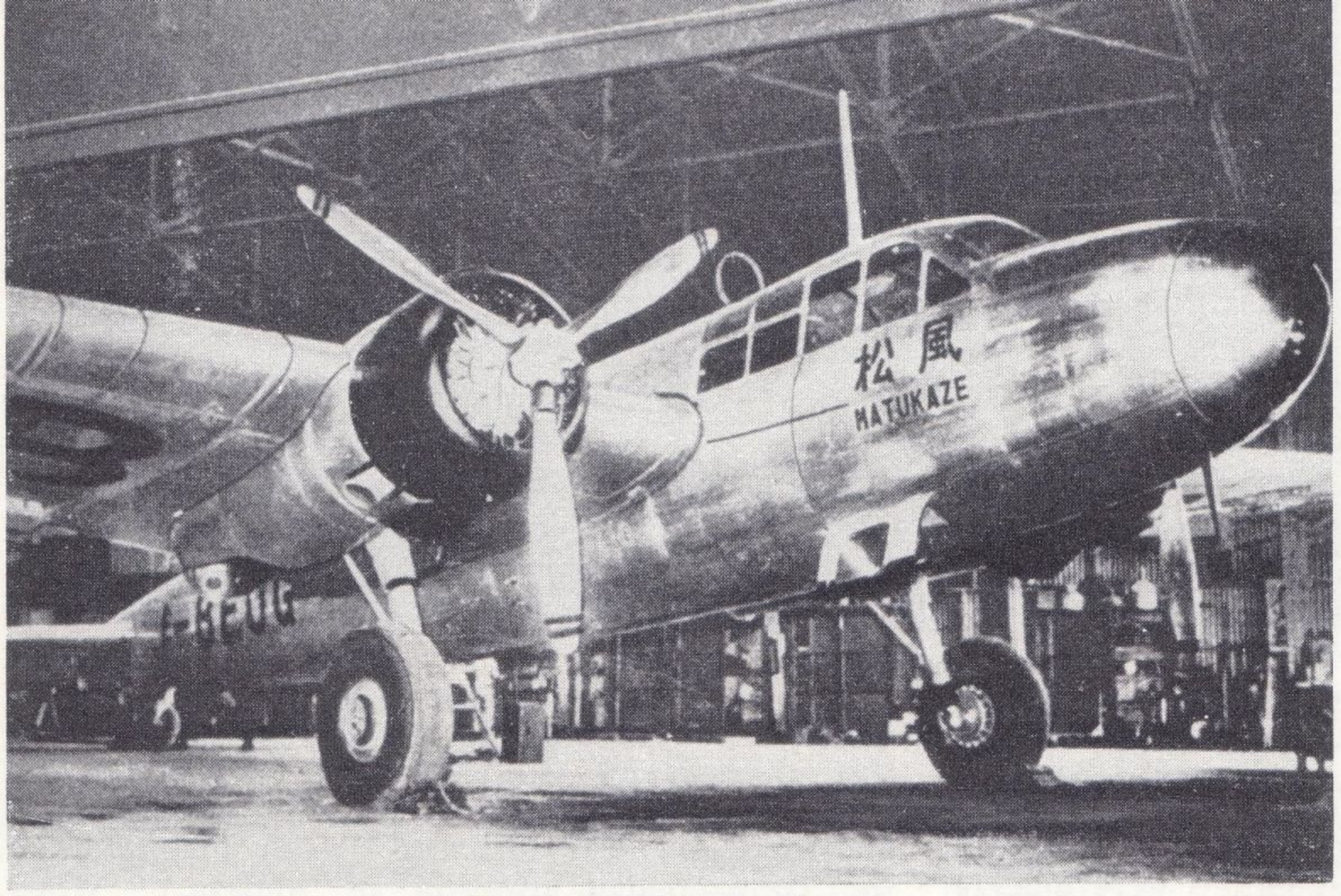
Like Germany, Italy and France, Japan realized the propaganda value of long distance international flights by civil versions of military aircraft and, starting in 1938, some two dozen G3M2's were converted as Mitsubishi Twin-engined Transports. Most of these aircraft were operated by *Dai Nippon Koku K.K.* (Greater Japan Air Lines) on their domestic network and on overwater flights to Korea, China, Formosa, Thailand and Japanese-held islands in the Pacific. Besides their normal operations some of these aircraft made "flag-waving" flights to foreign capitals, the most famous of these flights being those of J-BEOA "*Soyokaze*" to Teheran in the spring of 1939 and of J-BEOC "*Yamato*" to Rome a few months later. The Mitsubishi Twin-engined Transport retained the basic airframe and powerplant of the G3M2 but all armament was removed, a row of windows was added, an entrance door was built on the port fuselage side and accommodation was provided for eight passengers.

During the thirties a strong rivalry existed in Japan between two newspapers, *Asahi Shimbum* and *Mainichi Shimbum*. In April 1937, the *Asahi Shimbum* sponsored the flight between Tokyo and London by J-BAAI "*Kamikaze*", a civil version of the Army Type 97 Command Reconnaissance Plane (*Mitsubishi* Ki-15, Babs). Following the success of their competitor's flight, the *Mainichi Shimbum* initiated the planning for a round-the-world flight. Initially, the *Mainichi Shimbum* tried to buy the prototype Navy Experimental 8-Shi Reconnaissance Plane (Mitsubishi Ka-9) but the Imperial Japanese Navy could not release this important prototype and the round-the-world flight had to be postponed. At the end of 1938, the Imperial Japanese Navy agreed to release the 328th aircraft of the G3M series and, with Mitsubishi's co-operation, modified the aircraft as follows: all armament was removed, landing lights and navigator position were installed in the nose, a passenger cabin with windows was built in the centre fuselage, and the aircraft, a G3M2 Model 21, was brought up to Model 22 standards. The capacity of the petrol tanks was increased by 308 Imp. gallons (1,400 litres). Registered J-BACI and named "*Nippon*", the aircraft was ready in July 1939 and its crew immediately undertook intensive training. On 26th August 1939, "*Nippon*" and its crew (Sumitoshi Nakao, captain; Shigeo Yoshida, pilot; Hajime Shimokawa, navigator; Hiroshi Saeki, flight engineer; Nobusada Sata and Chosaku Yaokawa, radio operators; and Takeo Ohara, goodwill ambassador) were ready. After an inauspicious start, the propellers being damaged whilst the aircraft was towed out of its hanger and having to be replaced with those of J-BEOC "*Yamato*", the aircraft left on the first leg of its voyage and landed at Chitose Naval Air Base on Hokkaido. From then on the flight proceeded smoothly via Alaska, Canada, the United States—where news of the war in Europe

This Model 22, the 426th aircraft of the G3M series, was photographed by its designer Kiro Honjo.
(Photo: via Jiro Horikoshi)

** The designations G3M2a and G3M2b were sometimes given to the Model 21 and 22 respectively. However, these designations were never officially retained.*

Model 21 bombers of the 3rd Kokutai *seen on an airfield in China during the summer of 1941. The extended ventral turret can be seen under the aircraft in the foreground.*
(Photo: S. Tanaka)



J-BEOG "Matukaze", *one of the many G3M's modified for civil duties.* (Photo: via the author)

forced the cancellation of the proposed visits to Madrid, Paris, London and Berlin—Central and South America, Dakar, Casablanca, Rome, the Middle East, Southeast Asia and Formosa, the aircraft completing its flight around the world when it landed at Haneda Airport on 20th October after covering 52,860 km. (32,850 miles) in 56 elapsed days and 194 flying hours. Although it was known that this aircraft was a version of a bomber aircraft in service with the Imperial Japanese Navy, little attention was paid to this demonstration of Japanese aeronautical capabilities as the world was now preoccupied with the European conflict.

During the Pacific War, the Mitsubishi Twin-engined Transports were operated alongside the very similar Navy Type 96 Transports (L3Y1 and L3Y2, a military transport version of the G3M series) by *Dai Nippon Koku K.K.* on long distance flights linking Japan with Japanese occupied territories in the Pacific and in Southeast Asia.

PRELUDE TO THE WAR

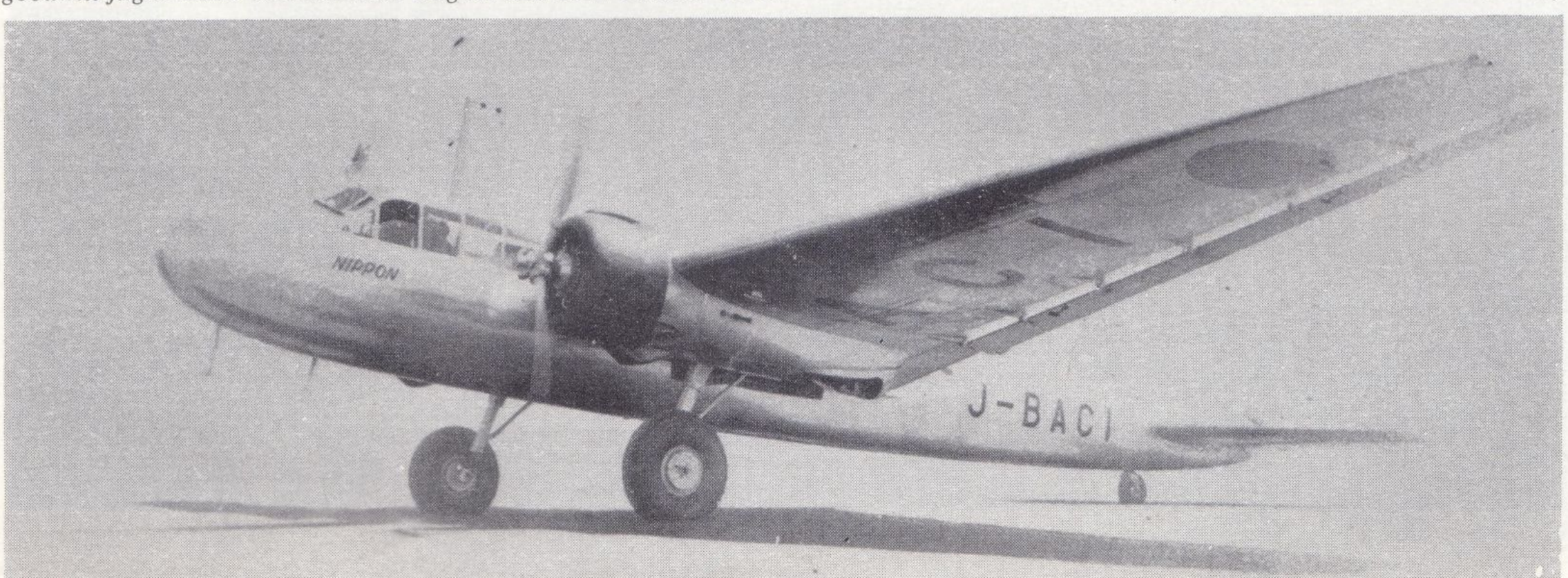
Whilst goodwill flights were flown by Japanese civil aircraft, other flights over foreign territories were carried out by G3M2's of the Imperial Japanese Navy without publicity or warning. In preparation for a war against the United States, and to supplement their efficient network of spies and informers, the Imperial Japanese Navy organized in the spring of 1941 a special unit to over-fly and photograph U.S. military bases in the Pacific (it should be noted that if the Japanese were the first to conduct these unauthorized flights in the Pacific, they were not alone in realizing the value of such flights; the U.S. Army Air Corps modified at least one Consolidated B-24 for similar missions over the Japanese held Marshall and Caroline Islands). The Imperial Japanese Navy 3rd *Kokutai* was activated at Takao, Formosa, and was equipped with G3M2's lacking all national and unit markings and painted light grey-blue. On these aircraft a large electrically-operated camera was installed in the centre fuselage at the bombardier position. Between April and June 1941, these aircraft, operated from Formosa, Peleliu Island, Truck and Tinian, photographed Allied installations in the Philippines, New Britain and Guam area. In July 1941, the 3rd *Kokutai* returned to Takao, but shortly thereafter the unit was disbanded to be re-activated in time to take an active part in the invasion of the Philippines as a fighter unit flying A6M2's.

When negotiations between the United States and Japan reached a dead-lock, the Imperial Japanese Navy had 396 land-based bombers in service of which 204 were G3M2's in first line units, 52 were G3M2's in second line units and 140 were G4M1's, these aircraft being based along a line extending from Saigon, French Indo-China, to Hokkaido (see Table II).

JAPAN STRIKES: THE LOSS OF H.M.S. PRINCE OF WALES AND H.M.S REPULSE

On the first day of the war fifty-four G3M2's, out of seventy-two aircraft held on strength by the *Takao Kokutai*, took off from Takao and, escorted by fifty A6M2's of the 3rd *Kokutai*, set course for Iba Field in the Philippines. Due to the time differential with Hawaii and to an early morning fog which had delayed their take-off, the Japanese bomber crews expected to be faced with strong opposition. Fortunately for them, the U.S. Army Air Force, which did

The newspaper Mainichi Shimbum *was provided with 328th machine of the G3M series modified by Mitsubishi for a round-the-world goodwill flight made between 26th August and 20th October 1939.* (Photo: U.S. National Archives)



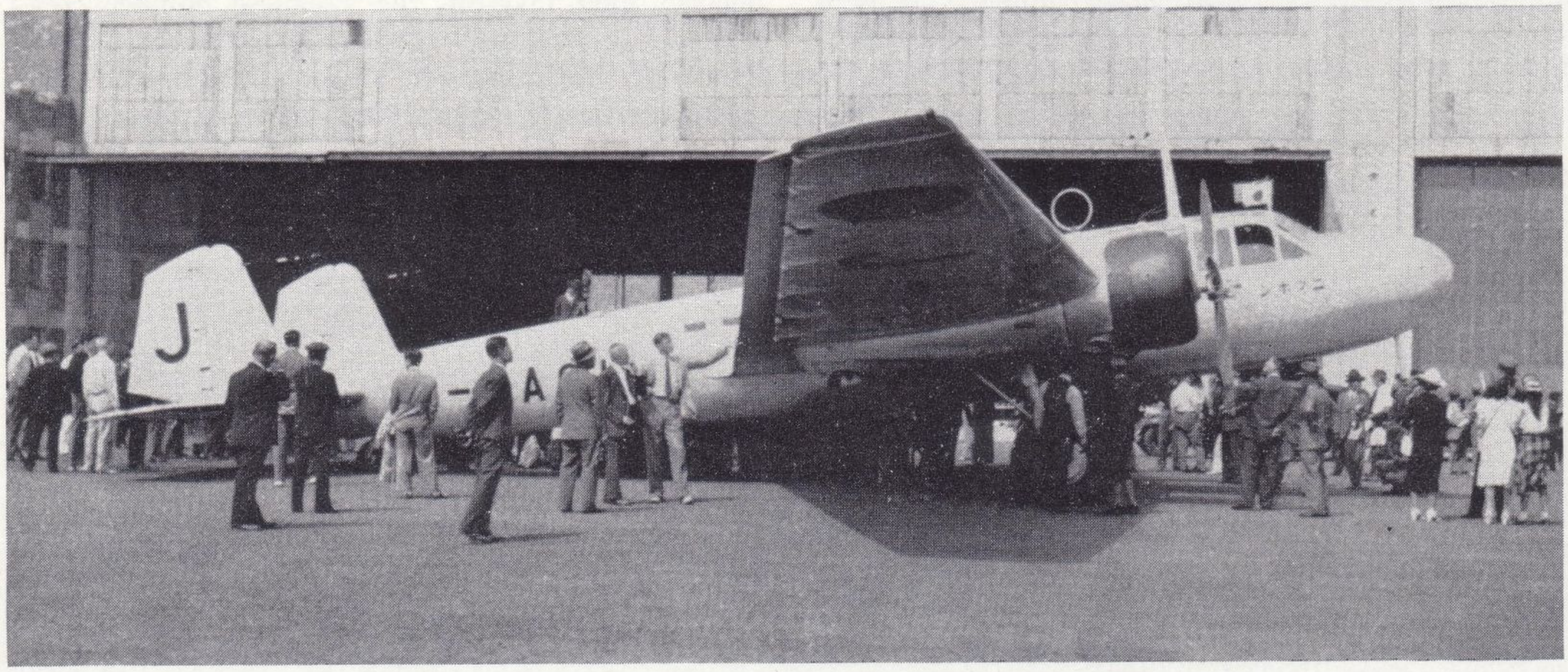
An in-flight study of J-BACI "Nippon". (Photo: Ikuo Komori)

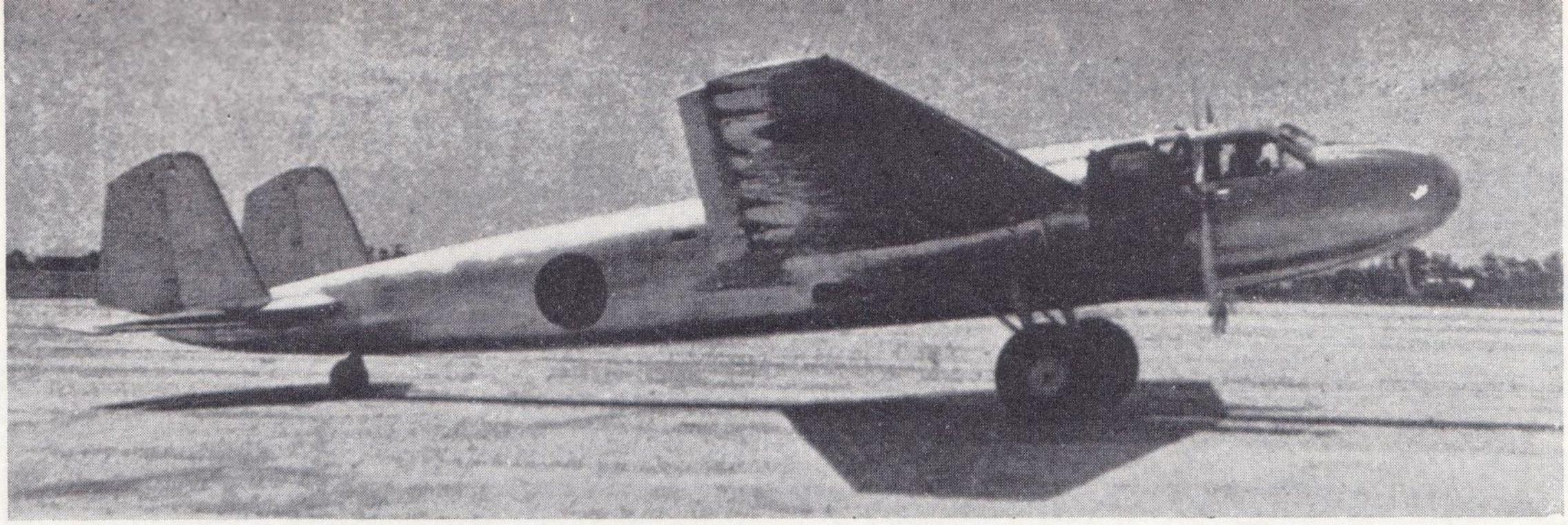
expect an attack on the Philippines to follow the raid on Pearl Harbour, had scrambled its fighters earlier in the morning and, when the Japanese bombers arrived, these fighters had landed to refuel. Some twenty-five aircraft were found on the airfield and these aircraft and ground installations were quickly destroyed. As similar successes had been achieved by the Navy Type 1 Attack Bombers (G4M1) of the 1st and *Kanoya Kokutais* and by the A6M2's of the *Tainan Kokutai*, the G3M2's soon switched from strategic to tactical missions in support of the Japanese ground forces. Later, reinforced with the G3M2's of the *Genzan* and *Mihoro Kokutais*, they took part in the operations culminating with the occupation of the Dutch East Indies and New Britain.

Whilst the *Takao Kokutai* was engaged against the American Forces in the Philippines the *Chitose Kokutai*, also flying G3M2's, took part in pre-invasion bombing raids on Wake Island. On their first mission the *Chitose Kokutai* destroyed on the ground seven F4F-3's of Marine Fighter Squadron 211 but the next day one of their aircraft was shot down by the Wildcats and they were unable to silence the coastal defence guns of the American garrison prior to an attempted landing by Japanese Marines on 11th December. The Japanese had to postpone their landing and, pending the arrival of Adm. Yamaguchi's Second *Koku Sentai* (2nd Carrier Division: *Soryu* and *Hiryu*), the G3M2's continued their attacks on the heroic defenders. With the invasion of Wake on 23rd December the *Chitose Kokutai* had completed their assigned task.

In late October 1941, the Imperial Japanese Navy deployed to Soctrang and Thudaumot, near Saigon, their *Genzan* and *Mihoro Kokutais* with a total of ninety-six G3M2's as well as thirty-six A6M2 fighters and six C5M2 reconnaissance aircraft, in support of the contemplated invasion of Malaya. When Japanese intelligence reported the arrival in the Indian Ocean of two British battleships, *H.M.S. Prince of Wales* and *H.M.S. Repulse*, twenty-seven G4M1's of the *Kanoya Kokutia* were also sent to French Indo-China. On 8th December 1941 (local time), the *Mihoro Kokutai* conducted a first bombing mission on Singapore whilst Japanese forces landed at Kota Bharu (Malaya), Singora and Patani (Thailand). The next day the British fleet, commanded by Vice-Admiral Sir Tom Phillips, sortied from Singapore with its two battleships and the destroyers *H.M.S. Electra*, *Express* and *Tenedos* and *H.M.A.S. Vampire*, but these ships were first spotted by the Japanese submarine I-56 and later by a C5M2 reconnaissance aircraft. On 10th December the Japanese, who feared an attack on their beachheads by the potent British fleet, launched a search and destroy operation mounting eighty-six twin engined bombers: 26 G3M2's of the *Genzan Kokutai*, 34 G3M2's of the *Mihoro Kokutai* and 26 G4M1's of the *Kanoya Kokutai*, and a reconnaissance unit with 9 G3M2's and 2 C5M2's. Sir Tom Phillips had felt that his fleet would be out of range of the Japanese bombers based in Indo-China and was unable to obtain fighter cover from the meagre R.A.F. forces then available in the area. Late in the morning the

An admiring crowd gathered around "Nippon" *shortly after its arrival at Oakland, California in 1939.* (Photo: via the author)





A Kinsei 3-powered L3Y1, the military transport converted from the obsolescent G3M1 by the Dai-Ichi Kaigun Kokusho.
(Photo: Tadashi Nozawa)

battleships were spotted by a G3M2 on a reconnaissance mission and the first hit was registered soon thereafter by level bombers of the *Mihoro Kokutai*, which hit *H.M.S. Repulse* with one 250 kg. bomb amidships. In the next two hours *Repulse* and *Prince of Wales* were repeatedly attacked and three hours after being first spotted both ships sank. The destroyers rescued some two thousand officers and men out of nearly three thousand, but Sir Tom Phillips was amongst the missing.

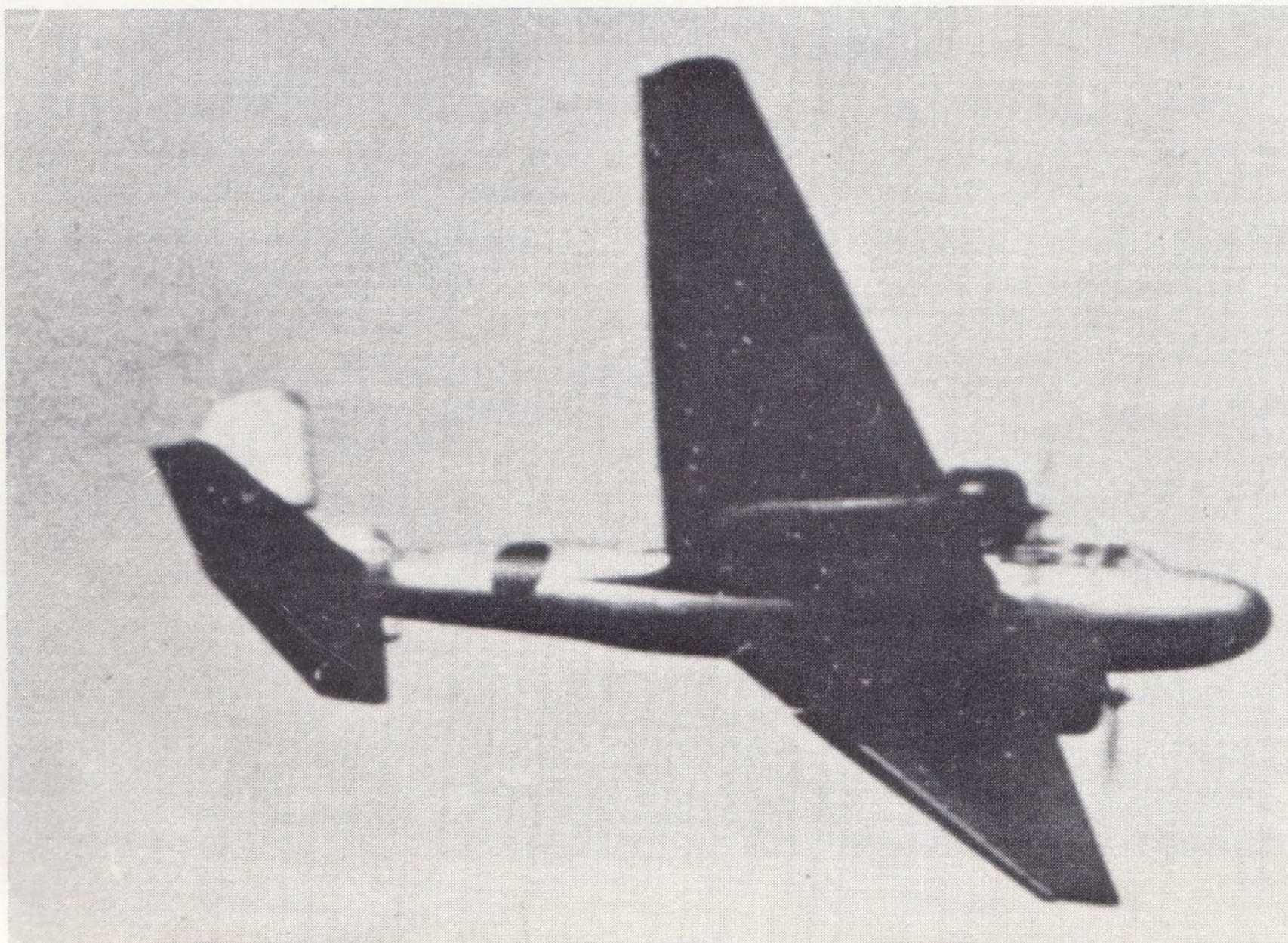
The price paid by the Japanese for this tremendous victory, which can be credited to Adm. Isokoru Yamamoto's insistence in developing an effective long-range bomber capable of co-operating with the fleet far out at sea, was light: one G3M2 and two G4M1's were shot down, one aircraft made a forced landing, two others were heavily damaged whilst twenty-five aircraft were slightly damaged. The claims made by both sides regarding the number of hits make an interesting addition to the list of exaggerated combat claims. The Japanese claimed to have sunk the *Repulse* with 14 torpedoes and one bomb and the *Prince of Wales* with 7 torpedoes and 2 bombs whilst the British admitted only 5 torpedo and one bomb hits on the *Repulse* and 4 torpedo and one bomb hits on the *Prince of Wales*. Whichever of these claims is accurate is a purely academic problem and there is no better way to assert the impact of this battle than to quote Sir Winston Churchill's own words in "The Great Alliance":

> "The readers of these pages will realize how many efforts, hopes, and plans foundered with these two ships . . . There were no British or American capital ships in the Indian Ocean or the Pacific except the American survivors of Pearl Harbour, who were hastening back to California. Over all this vast expanse of waters Japan was supreme, and we everywhere weak and naked".

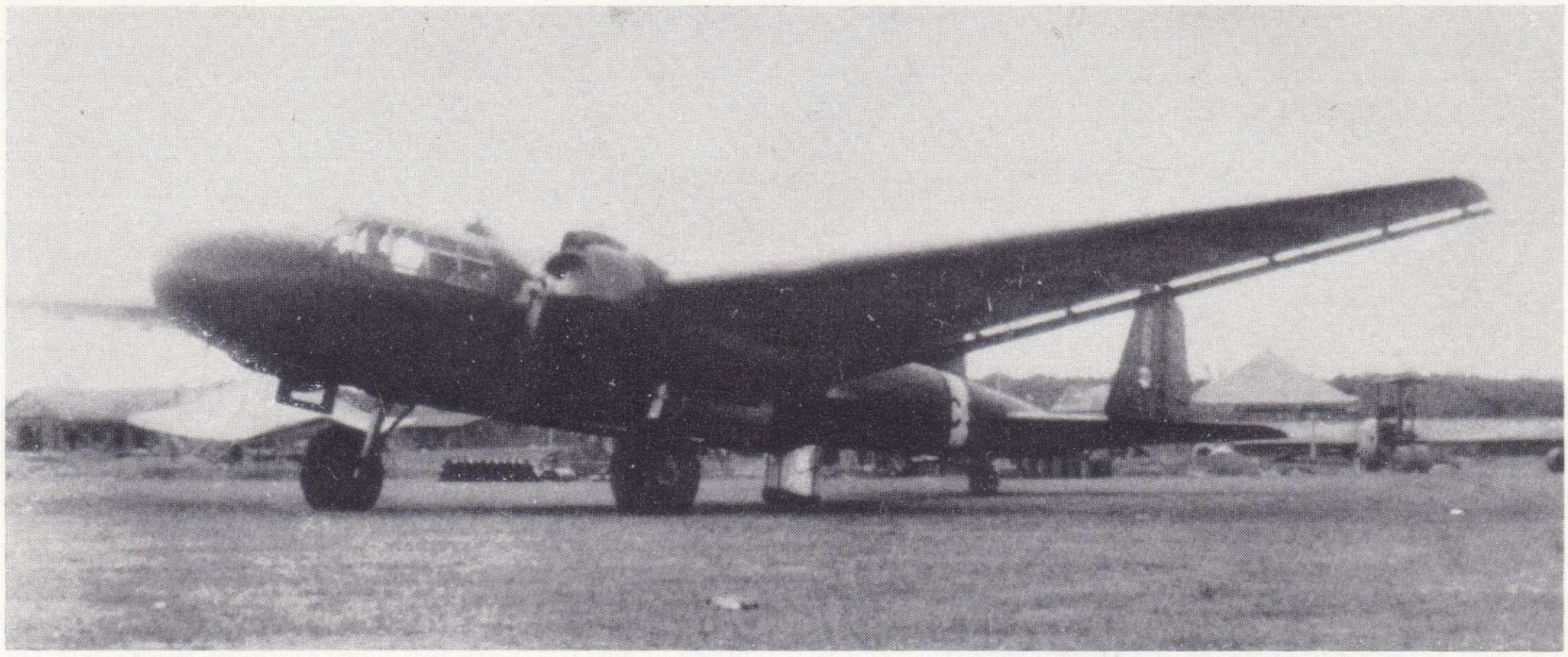
SECOND LINE ASSIGNMENT

Shortly before the beginning of the war Mitsubishi had stopped production of its G3M2 to concentrate on manufacturing its successor, the G4M1. However, Nakajima continued for another eighteen months to build G3M2's and G3M3's. The G3M3, or Navy Type 96 Attack Bomber Model 23, was essentially identical to the Model 22 aircraft except for the use of a pair of 1,300 h.p. "Kinsei 53" which allowed an increase of 26 m.p.h. in maximum speed and for a fuel tankage increased to 5,182 litres (1,140 Imp. Gallons) and carried in fifteen unprotected tanks (2 tanks in each inner wing, 5 tanks in each outer wing and an auxiliary fuselage tank). These aircraft remained in first line service until late in 1943 and were being supplanted by Navy Type 1 Attack Bombers. Already in July 1942 (see Table III) more Bettys were in first line service than Nells and this trend was accelerated following heavy losses during the Guadalcanal campaign.

As the G3M were phased out of first line operations many were converted at the First Naval Air Arsenal at Kasumigaura (*Dai-Ichi Kaigun Kokusho*) into Navy Type 96 Transport Model 11 (L3Y1) and Model 12 (L3Y2). The "Kinsei 3" powered L3Y1's were modified from G3M1's whilst the L3Y2's were converted from "Kinsei 45" powered G3M2's. Like the civil Mitsubishi Twin-engined Transport,



An in-flight view of a Navy Type 96 Transport Model 11 (L3Y1).
(Photo: Heinz J. Nowarra)



Powered by Kinsei 45 engines, the G3M1-L was fitted with passenger seats but retained the armament of the bomber.
(Photo: Heinz J. Nowarra)

the L3Y1 and L3Y2 had a row of cabin windows and a door on the port fuselage side but they were armed with one 7·7 mm. machine gun. In the Allied code-name system the aircraft was known as Tina and, at first, was thought to be a J.A.A.F. aircraft, the "Mitsubishi Ki-33 Type 96 Transport".

Besides operating as trainers, the obsolete Navy Type 96 Attack Bombers were used as maritime reconnaissance aircraft with search radar whilst some others were used to tow MXY5 Special Transport Gliders. Finally the aircraft were used for the famous "green cross" flights prior to being scrapped by the victors.

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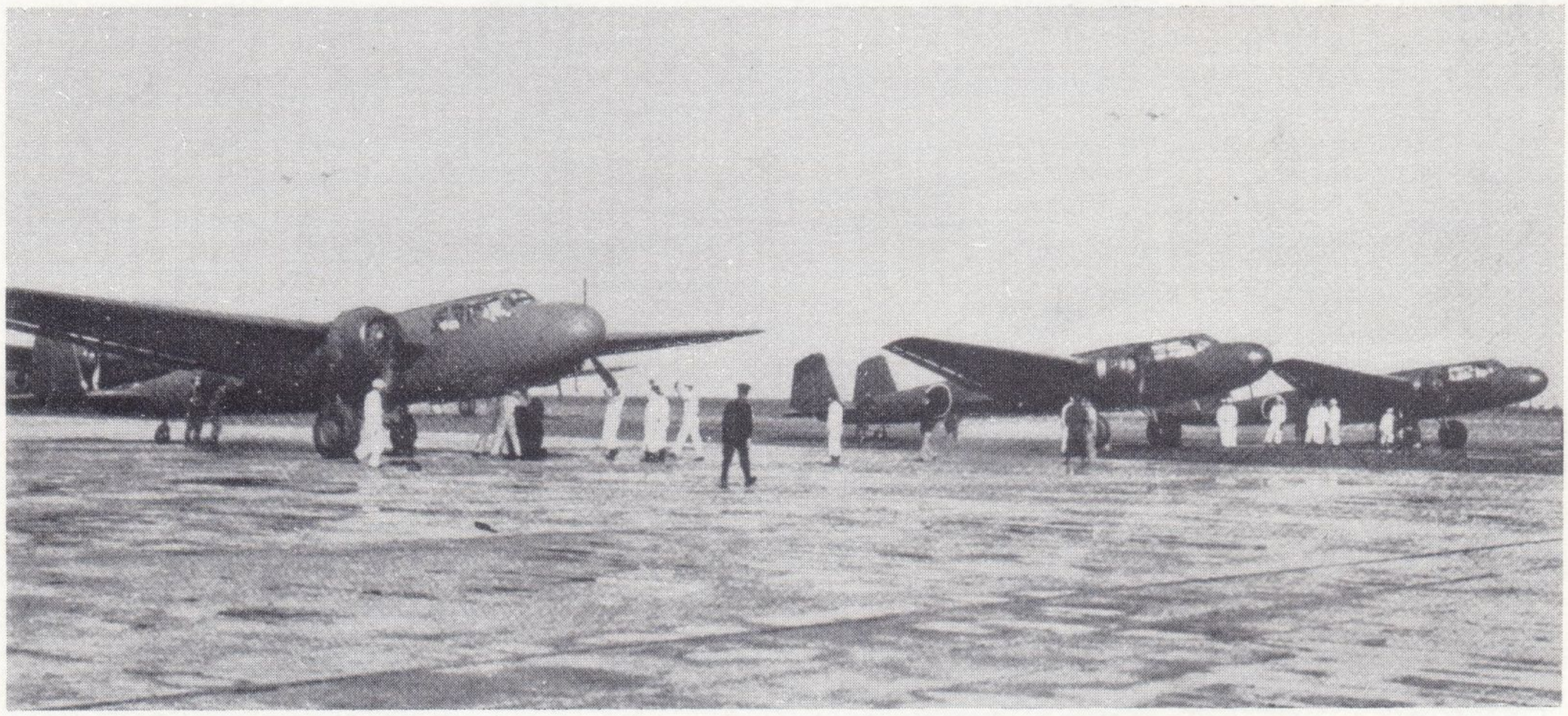
TABLE I: SPECIFICATION OF CONTEMPORARY BOMBER AIRCRAFT

	Mitsubishi G3M1	Armstrong Whitworth Whitley I	Douglas B-18	Heinkel He 111B-1
Span	82 ft. 0¼ in.	84 ft.	89 ft. 6 in.	74 ft. 1¾ in.
Length	53 ft. 11⅝ in.	69 ft. 3 in.	56 ft. 8 in.	56 ft. 7 in.
Wing Area	807·3 sq. ft.	1,232 sq. ft.	959 sq. ft.	942·9 sq. ft.
Loaded Weight	16,848 lb.	21,660 lb.	21,130 lb.	17,637 lb.
Wing Loading	20·9 lb./sq. ft.	17·6 lb./sq. ft.	22·0 lb./sq. ft.	18·7 lb./sq. ft.
Take-off Power	2 ×910 h.p.	2 ×920 h.p.	2 ×930 h.p.	2 ×1,000 h.p.
Power Loading	7·9 lb./h.p.	11·8 lb./h.p.	11·4 lb./h.p.	8·8 lb./h.p.
Maximum Speed	216 m.p.h.	192 m.p.h.	217 m.p.h.	248·5 m.p.h.
Service Ceiling	24,540 ft.	19,000 ft.	24,200 ft.	—
Normal Range	1,800 miles	1,250 miles	1,082 miles	745 miles
Defensive Armament	3 ×7·7 mm.	2 ×0·303 in.	3 ×0·30 in.	3 ×7·92 mm.
Normal bomb-load	1,764 lb.	3,365 lb.	4,000 lb.	2,200 lb.

A line-up of L3Y1's used for paratroop transport. (Photo: via the author)



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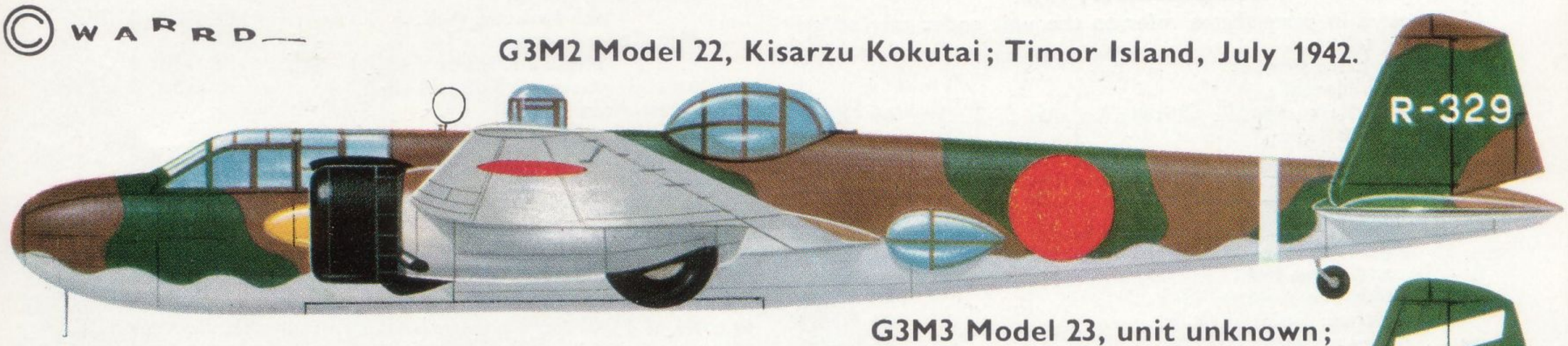
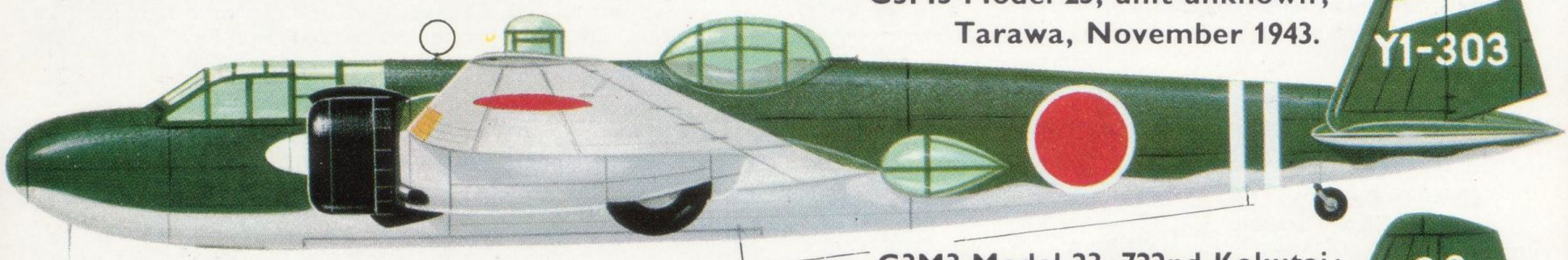
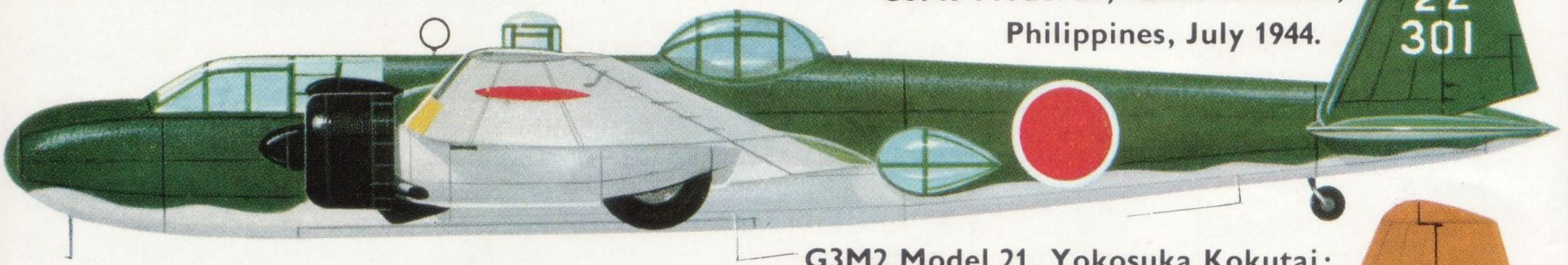
G3M2 Model 22, Kisarzu Kokutai; Timor Island, July 1942.



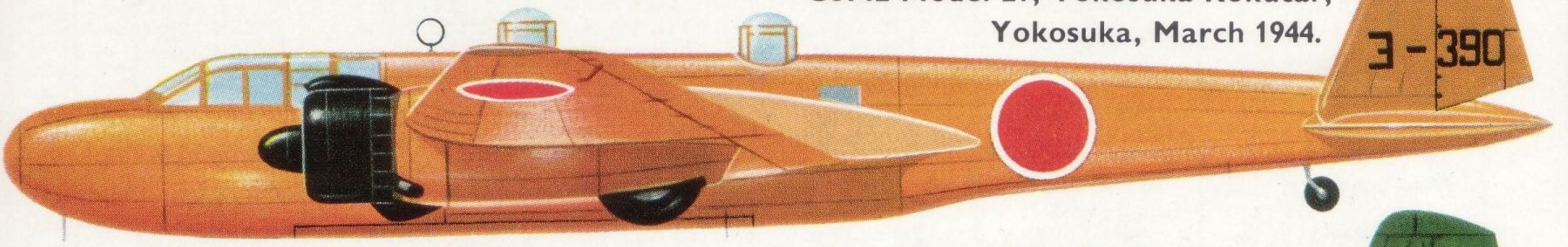
G3M3 Model 23, unit unknown;
Tarawa, November 1943.



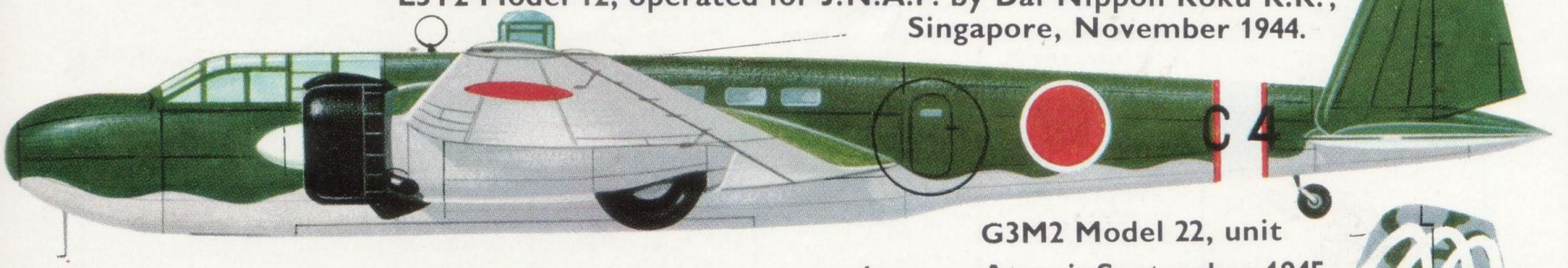
G3M3 Model 23, 722nd Kokutai;
Philippines, July 1944.



G3M2 Model 21, Yokosuka Kokutai;
Yokosuka, March 1944.



L3Y2 Model 12, operated for J.N.A.F. by Dai Nippon Koku K.K.;
Singapore, November 1944.



G3M2 Model 22, unit
unknown; Atsugi, September 1945.

starboard
ソホツ=

Converted G3M2 Model 21 (328th a/c); round-the-world flight,
27th August—20th October 1939.

TABLE II:
IMPERIAL JAPANESE NAVY ORDER OF BATTLE
LAND BASED BOMBER UNITS
7th December, 1941

(Characters in parentheses refer to the unit codes carried on aircraft tails.)

A.—**First Line Force:**

Fourth Kantai		
24th Koku Sentai:	Chitose Kokutai (S-3 . .)	36 G3M2
Eleventh Kantai		
21st Koku Sentai:	Kanoya Kokutai (K-3 . .)	72 G4M1
	1st Kokutai (-3 . .)	48 G4M1
22nd Koku Sentai:	Mihoro Kokutai (M-3 . .)	48 G3M2
	Genzan Kokutai (G-3 . .)	48 G3M2
23rd Koku Sentai:	Takao Kokutai (T-3 . .)	72 G3M2
B.—**Second Line Force:**		
	Yokosuka Kokutai (∃-3 . .)	12 G3M2
	Kisarazu Kokutai (R-3 . .)	40 G3M2
	(converting to G4M1's)	20 G4M1
	TOTAL	256 G3M2 140 G4M1

TABLE III:
IMPERIAL JAPANESE NAVY ORDER OF BATTLE
FIRST LINE LAND BASED BOMBER UNITS
14th July, 1942

Eleventh Kantai		
22nd Koku Sentai:		
	Mihoro Kokutai (M-3 . .)	36 G3M
	Genzan Kokutai (G-3 . .)	36 G3M
24th Koku Sentai:		
	Chitose Kokutai (S-3 . .)	36 G4M
	1st Kokutai (-3 . .)	36 G4M
25th Koku Sentai:		
	4th Kokutai (-3 . .)	48 G3M & G4M
26th Koku Sentai:		
	Misawa Kokutai (-3 . .)	36 G3M & G4M
	Kisarazu Kokutai (R-3 . .)	36 G3M & G4M
Southwest Area Kantai		
21st Koku Sentai:		
	Kanoya Kokutai (K-3 . .)	48 G4M
23rd Koku Sentai:		
	Takao Kokutai (T-3 . .)	48 G4M
	TOTAL	360 G3M & G4M

TABLE IV: PRODUCTION

A total of 1,048 G3M's were built by Mitsubishi Jukogyo K.K. at Nagoya and Nakajima Hikoki K.K. at Koizumi as follows:

Mitsubishi: 21 Ka-15 prototypes (1935–1936)
34 G3M1 Model 11 production aircraft (1936–1937)
343 G3M2 Model 21 production aircraft (1937–1939)
238 G3M2 Model 22 production aircraft (1939–1941)
636

Nakajima: 412 G3M2 Model 22 and G3M3 Model 23 production aircraft (1941–1943).

TABLE V: SPECIFICATIONS

	Ka-15 First prototype	G3M1 Model 11	G3M2 Model 22	G3M3 Model 23	Civil Transport "Nippon"
Span	25·0 m. 82 ft. 0¼ in.	25·0 m. 82 ft. 0¼ in.	25·0 m. 82 ft. 0¼ in.	25·0 m. 82 ft. 0¼ in.	25·0 m. 82 ft. 0¼ in.
Length	16·45 m. 53 ft. 11⅝ in.	16·45 m. 53 ft. 11⅝ in.	16·45 m. 53 ft. 11⅝ in.	16·45 m. 53 ft. 11⅝ in.	16·45 m. 53 ft. 11⅝ in.
Height	3·685 m. 12 ft 1 1/16 in.	3·685 m. 12 ft. 1 1/16 in.	3·685 m. 12 ft. 1 1/16 in.	3·685 m. 12 ft. 1 1/16 in.	3·685 m. 12 ft. 1 1/16 in.
Wing Area	75·0 sq. m. 807·3 sq. ft.	75·0 sq. m. 807·3 sq. ft.	75·0 sq. m. 807·3 sq. ft.	75·0 sq. m. 807·3 sq. ft.	75·0 sq. m. 807·3 sq. ft.
Empty Weight ...	4,000 kg. 9,700 lb.	4,770 kg. 10,516 lb.	4,965 kg. 10,936 lb.	5,243 kg. 11,551 lb.	— —
Loaded Weight ...	7,250 kg. 15,984 lb.	7,642 kg. 16,848 lb.	8,000 kg. 17,637 lb.	8,000 kg. 17,637 lb.	— —
Wing Loading * ...	96·7 kg./sq. m. 19·8 lb./sq. ft.	101·9 kg./sq. m. 20·9 lb./sq. ft.	106·7 kg./sq. m. 21·8 lb./sq. ft.	106·7 kg./sq. m. 21·8 lb./sq. ft.	— —
Power Loading * ...	4·8 kg./h.p. 10·7 lb./h.p.	3·6 kg./h.p. 7·9 lb./h.p.	3·7 kg./h.p. 8·1 lb./h.p.	3·7 kg./h.p. 8·1 lb./h.p.	— —
Fuel Capacity ...	3,805 l. 837 Imp. gallons	3,805 l. 837 Imp. gallons	3,694 l. 813 Imp. gallons	5,182 l. 1,140 Imp. gallons	— —
Engine	2 × Hiro Type 91	2 × Kinsei 3	2 × Kinsei 45	2 × Kinsei 51	2 × Kinsei 41
Take-off Rating ...	750 h.p.	910 h.p.	1,075 h.p.	1,300 h.p.	900 h.p.
Military Rating ...	600 h.p. at sea level	790 h.p. at 2,000 m. (6,560 ft.)	1,000 h.p. at 4,180 m. (13,715 ft.)	1,200 h.p. at 3,000 m. (9,845 ft.)	—
Maximum Speed ...	170·3 kt. at 1,500 m. 196 m.p.h. at 4,920 ft.	188 kt. at 2,000 m. 216 m.p.h. at 6,560 ft.	201·5 kt. at 4,180 m. 232 m.p.h. at 13,715 ft.	224·5 kt. at 5,900 m. 258 m.p.h. at 19,360 ft.	— —
Cruise Speed ...	— — —	— — —	150 kt. at 4,000 m. 173 m.p.h. at 13,125 ft.	160 kt. at 4,000 m. 184 m.p.h. at 13,125 ft.	280 km./h. —
Climbing Speed: to in	3,000 m. (9,845 ft.) 9 min. 40 sec.	3,000 m. (9,845 ft.) 9 min. 47 sec.	3,000 m. (9,845 ft.) 8 min. 19 sec.	3,000 m. (9,845 ft.) 5 min. 29 sec.	— —
Service Ceiling ...	— —	7,480 m. 24,540 ft.	9,130 m. 29,950 ft.	10,280 m. 33,730 ft.	8,000 m. 26,250 ft.
Range	— —	— —	2,365 n. miles 2,722 miles	3,363 n. miles 3,871 miles	3,500 km. 2,175 miles
Defensive Armament	3 × 7·7 mm. Type 92 — —	3 × 7·7 mm. Type 92 — —	1 × 20 mm. Type 99 Mk. 1 and 4 × 7·7 mm. Type 92	1 × 20 mm. Type 99 Mk. 1 and 4 × 7·7 mm. Type 92	— — — —
Bomb-load	800 kg. 1,764 lb.	800 kg. 1,764 lb.	800 kg. 1,764 lb.	800 kg. 1,764 lb.	— —

* At normal loaded weight and take-off rating.

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